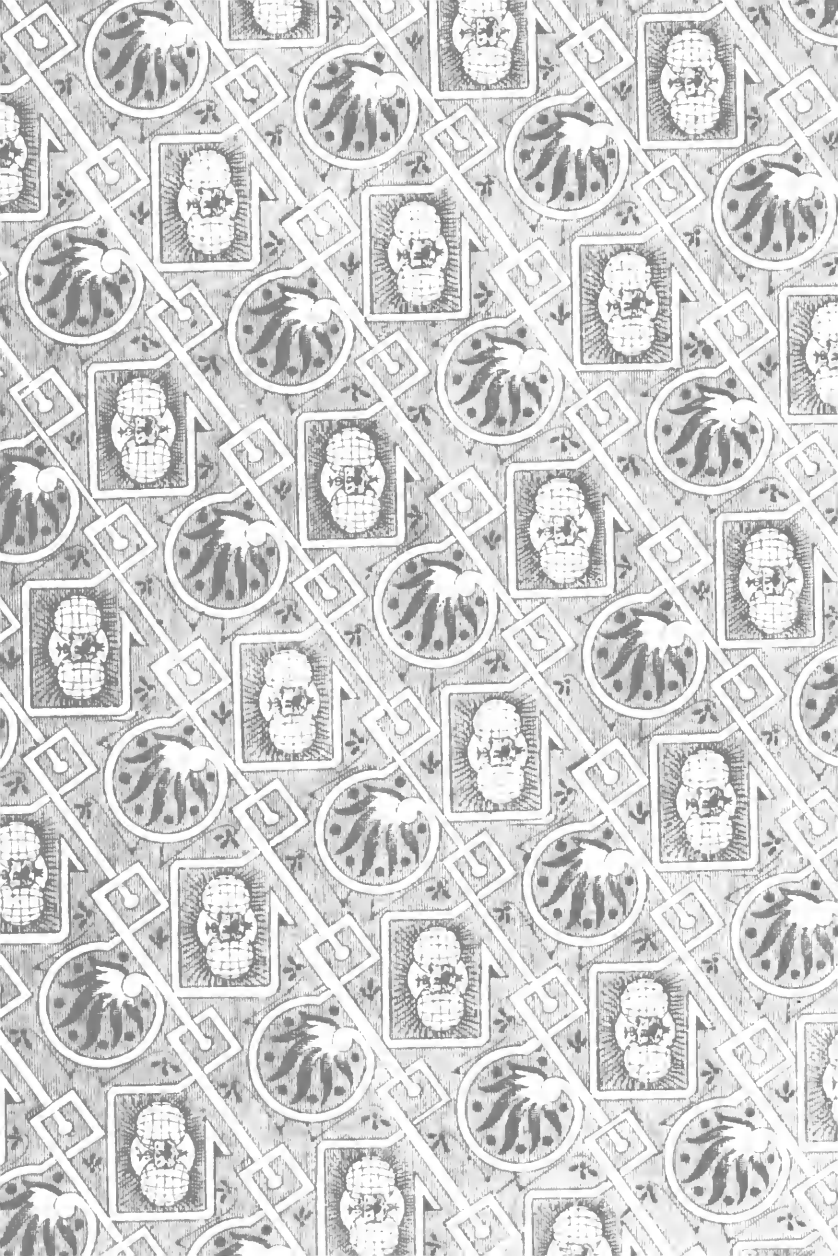


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ANNUAL

OF THE

UNIVERSAL MEDICAL SCIENCES

A YEARLY REPORT OF THE PROGRESS OF THE GENERAL
SANITARY SCIENCES THROUGHOUT THE WORLD.

EDITED BY

CHARLES E. SAJOUS, M.D.,

AND

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ASSISTED BY

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GENERAL THERAPEUTICS.

By J. P. CROZER GRIFFITH, M.D.,

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Acetanilid.—This drug has been successfully employed by J. A. Randall¹⁸⁶_{Feb.} in dysmenorrhœa and neuralgic headaches with alleged remarkable success. Five-grain (0.32 gramme) doses were given. He also reports good results from its use in irritable bladder and in the paroxysms of asthma. He considers acetanilid fully equal, if not superior, to the bromides; as an analgesic, second only to morphine; and, as antipyretic, the best remedy in the treatment of bronchitis, pneumonia, and rheumatism. It has been employed by Mills C. Brasher¹⁹²_{Sept.} when such indications as pain and high temperature exist. He has found it especially valuable when the pulse is full and bounding. Good results have been obtained in cases of facial neuralgia, in headache with throbbing temples, in typhoid fever, in the exanthemata, and in the treatment of influenza, dysmenorrhœa, and other painful disorders. For chronic malarial poisoning, J. Wilton Hope⁸¹_{May} has used with success the following prescription: acetanilid, salol, and sulphate of quinine, of each 24 grains (1.55 grammes), the combination to be divided into 12 capsules. One capsule is administered every six hours. The author affirms that the same mixture is valuable in many cases of continued fevers. To prevent decomposition in solutions employed for hypodermatic injections, Thomas J. Keenan²⁰⁹_{No. 5; Aug.}⁶⁷³ recommends acetanilid as superior to such substances as glycerin, alcohol, chloroform, salicylic acid, and boric acid. He claims that it preserves the solutions without modifying the action of the medicine used. J. W. C. ⁸²_{May 21} reports a case of poisoning by acetanilid in a lady, 36 years of age, suffering from an attack of influenza, and who had taken about 40 grains (2.59 grammes),

in divided doses, in the course of four hours. The chief symptoms exhibited were semi-unconsciousness; delirium; a very feeble pulse; short, rapid breathing; cyanosis of face and lips, and cold extremities. The patient recovered under the use of alcoholic stimulants and the hypodermatic injection of strychnine. F. W. Lester⁷⁶⁰_{Feb. 27} has called attention to a peculiarity of the action of acetanilid in his own person. He takes the drug frequently for the relief of headache. On going into the open air, while under its influence, he is conscious of a delightful odor, not unlike that of the tuberose. He has noticed the same odor with antikamnia, and infers from this that the latter combination must contain acetanilid.

Aconitine.—See *Aconite*.

Aconite.—Fleury¹²⁷_{Feb. 12} contends that only crystallized aconitine should be employed for therapeutic purposes. In an editorial comment,²⁰²_{May 26} reference is made to the warning of Lepine regarding the employment of aconitine. The nitrate of aconitine, the salt generally used, is given by practitioners in doses of 0.002, 0.003, and even 0.004 gramme ($\frac{1}{32}$, $\frac{1}{22}$, and $\frac{1}{16}$ grain), which are relatively large quantities and apt to be followed by bad, if not serious, results. Prudence should be exercised in the use of this medication. If small doses do not produce the desired effect, it is then wiser to forego the further use of the remedy in question.

Agathin.—Under this name a new antineuralgic has been quite recently brought into the notice of the profession. This substance was discovered by J. Roos, of Frankfort-am-Main.^{826 673}_{July; Sept.} Agathin is salicyl-alpha-methyl-phenyl-hydrazone, and is obtained by the interaction of salicylic aldehyde and alpha-methyl-phenyl-hydrazine. It occurs in the form of a greenish-white, crystalline substance, odorless and tasteless, insoluble in water, soluble in alcohol and ether, and having a melting-point of 74° C. (165.2° F.). Rosenbaum and other physicians have tried the new remedy in nervous affections, with fairly satisfactory results. Roos found that it first took effect after 60 to 90 grains (2 to 3 grammes) had been administered, the drug increasing the appetite and perspiration; but that violent headache generally occurred for half an hour after taking 8- or 10-grain (0.52 or 0.65 gramme) doses. These results were obtained in the treatment of rheumatic disorders. L. Lagner found that the action of agathin is not momentary but cumulative, and described a case of supra-orbital neuralgia, in which salicylic

acid was useless, that was completely cured after twelve doses of 8 grains (0.52 gramme) of agathin had been taken. No untoward effects were observed. D. Lowenthal has also reported the successful treatment with agathin of several cases of neuralgia and two difficult cases of rheumatism of the joints in which the salicylate of sodium had been of no avail.

Air (Compressed and Rarefied).—After a large experience, W. Brugelmann¹¹⁶_{Mar.} has come to the conclusion that compressed air is a better remedial agent than oxygen. He considers it an eminently successful factor in the healing art, and believes that it produces excellent results in the treatment of asthma, emphysema, bronchial catarrh, chlorosis, pleurisy, and valvular diseases of the heart. He reports two cases of chlorosis in which much benefit followed the compressed-air treatment, and he holds that, with deep breathing accomplished, every case of chlorosis will recover under proper guidance. Emphysema is most favorably affected by the treatment with rarefied air. The compressed air, which has been passed through a flask containing a solution of carbolic acid or eucalyptus or creolin, acts well upon chronic bronchial catarrh. The tough mucus adhering to the bronchioles is mechanically removed, and the mucous membrane, brought again in contact with disinfected air, heals. If the sitting is followed by an inhalation of chloride of ammonium, the most favorable result is obtained. In pleuritic effusions, not of too long standing, the compressed air gradually increases the air-holding territory in the chest, and the adhesions are either torn asunder or so loosened that the breathing capacity is much extended. For valvular defects, not too far advanced, the intra-thoracic pressure secures a mechanical lessening of the hypertrophied heart-muscle, and this relieves the difficulty. The author has often seen œdema disappear, and appetite, sleep, and the secretion of urine also improve, and he regards the pneumatic treatment as a very valuable aid in the treatment of valvular defects. With the exception of a slight faintness, no untoward effects are caused by compressed air. He believes, however, that the pneumatic treatment is contra-indicated in most cases of tuberculosis. He has certainly seen such patients, after a short use of compressed air, develop metastatic foci in other parts of the lungs,—a danger which can never be foreseen in ordering the treatment. The hard breathing sends the tubercular particles

along with the air, and these become attached to other places, where they set up the tubercular process.

Alcohol.—In a lecture delivered before a meeting of the N. E. Ohio Medical Association, A. B. Walker²³³_{May} reviews intelligently the therapeutic uses of alcohol, making a collation of the best thought of the profession on the matter. Among other accurate statements, the author makes the following: "When an anæsthetic is to be given, it is a very good plan to give from one-half to one ounce of brandy or whisky an hour before. The patient takes the anæsthetic better, and I believe there is less danger from heart-failure. But during chloroform or ether narcosis *alcohol should not be given* (we have italicized the words), for it will only add to the existing trouble." We are glad to observe that the truth concerning the noxious action of alcohol in narcosis from anæsthetics, determined by Wood in his able experimental researches, has begun to be disseminated, as it certainly deserves. We believe that the use of hypodermatic injections of alcohol in chloroform or ether narcosis, as recommended and employed heretofore, has been an error, and should be abandoned. To disguise the disagreeable taste of castor-oil, Jankowski¹⁰⁴⁵_{No. 10} ⁶⁷³_{Aug.} suggests the mixture, in a wineglass, of a teaspoonful of cognac and the necessary amount of castor-oil. The mouth is then rinsed with another teaspoonful of the cognac, and the oil-mixture taken. The author affirms that in this manner the taste of the oil is not perceived. No other very important papers on the subject of alcohol or alcoholism have of late appeared, but mention may be made of the following: W. A. Morris, of Austin⁶⁴⁵_{Nov., '91}; E. R. Armistead, of Prescott, Ark.⁵⁰⁶_{Nov. 15, '91}; Zwaghienzeff⁵⁸⁶_{No. 98, '91}; H. J. Parker, of Clayton, Ill.¹⁹⁹_{Jan. 5}; and the exceedingly interesting one of Combemale, of Lille.⁶⁷_{Apr. 30}

Aldehyde.—Trillat³_{June 1} has communicated to the Académie des Sciences his experience in regard to the therapeutic value of formic aldehyde. This medicament, known also as the oxide of methylene, has exhibited, according to the author, antiseptic properties superior to those of the bichloride of mercury. Formic aldehyde has been found to be of especial value in arresting putrefaction and the development of micro-organisms. It is qualified to render great service in practical medicine. It coagulates albumen quite promptly. A 40-per-cent. solution turns a solution of albumen into a transparent, insoluble, gelatinous mass.

Aliments.—E. Krauss²⁰²_{Mar.25} writes favorably of beef-meal and beef-cacao in dietetics. He reports nine cases of children, suffering from a variety of infantile diseases, in which the most satisfactory results were obtained from the use of the articles mentioned. He believes that beef-meal and beef-cacao are especially indicated in rachitis; in convalescence from severe disease, such as scarlatina, diphtheria, etc.; in febrile disorders in which the digestive organs are enfeebled; in chronic diseases which are accompanied by anæmia, and in chronic gastro-intestinal catarrh. The author further remarks that in private practice he found beef-cacao of the greatest service in the treatment of dyspepsia, and gastric and enteric catarrhs. The beef-cacao was preferred by children 3 to 4 years of age, as many of these young patients did not like the beef-meal. This latter preparation, however, was well taken by older children. In the majority of cases both the beef-cacao and the meal, in the form of soup, were administered twice daily.

J. L. Cleveland, of Cincinnati, Ohio,⁵³_{Nov.14} reports an interesting case illustrative of the advantages of forced alimentation. With the exception, perhaps, of the work of Jorissen, Gilkinet, and Henrijean,²⁹³_{Nov.,'91} on peptones; that on the starch of the banana as a food for invalids, by W. Gilman Thompson, of New York,⁹⁴⁶_{Feb.} other publications have been more in the way of review than of original investigation. Those, however, especially interested in the subject are referred to articles by the following authors: Mary Strong, of Omaha¹⁰⁶_{Dec.,'91}; O. D. Fitzgerald, of Los Angeles⁴⁴_{Feb.}; Charles McIntire,⁷⁸⁷_{Jan.}; Wm. H. Walling, of Philadelphia,⁷⁶⁰_{Feb.6} and John V. Shoemaker, of Philadelphia.¹²¹_{July 19}

Amyl Nitrite.—Arthur Devoe, of Seattle, Washington,¹⁷⁶_{Mar.} states that he has often verified the value of amyl nitrite for the relief of the peculiar flushings and depressed mental condition of the climacteric period in the female; as also for the nervous and hysterical troubles of younger women, characterized by suffocating spells, spasms, cold hands and feet, etc. In these cases he employs the remedy internally, in doses of from $\frac{1}{1000}$ to $\frac{1}{100}$ of a drop in cold water, or in larger amounts by inhalations.

Anagallis Arvensis.—G. Dacomo and P. L. Tommasoli⁶¹⁵_{No.4; Aug.} have been able to extract from this plant a digestive ferment, which appears in the form of an amorphous, friable powder. It is said that the powder possesses digestive properties equal to the crude

plant, but that it apparently loses, after some time, its efficacy in digesting proteids.

Aniline.—Thayer, of Baltimore,⁸⁵⁸ ¹¹²_{Jan., Feb.; Apr.} has used, with apparent success, methylene blue in the treatment of malarial fever, and has so far corroborated the results previously announced by Guttman and Ehrlich. Thayer at first reports five cases, four of which were of the more severe and chronic type of the malarial disorder. In one case the plasmodia disappeared by the fourth day; in the second, the organisms had not entirely disappeared by the twenty-third day; in the third, no plasmodia were detected in the blood after the ninth or tenth day, and in Case 4 none were seen after the ninth day. Considering the chronic character of the cases treated, the author believes that the drug acted satisfactorily. The dose of the medicament was, on an average, 0.1 gramme ($1\frac{1}{2}$ grains) five times per day. The only untoward effect produced, when given by itself, was that of strangury, but this was relieved by the ingestion of nutmeg. This unpleasant symptom did not appear if the nutmeg was given from the beginning. The urine appeared deep-blue in all cases, but the faeces assumed this color only on exposure. Two other cases were subsequently reported by the author, in which the same satisfactory results were obtained by the employment of the methylene blue in the treatment of malarial disease. In one of these cases the plasmodia promptly disappeared from the blood; in the other, no organisms were detected after the fourteenth day. After the administration of the drug no chills occurred. These latter cases were of the quartan and quotidian types respectively.

Gillet de Grandmont,⁶_{Mar. 5} has reported a case of retinitis due to acute Bright's disease, in which excellent results were obtained by the administration of methylene blue. He gave it to a patient in doses of 0.02 gramme ($\frac{1}{5}$ grain) three times a day. Improvement was soon noticed, the renal symptoms disappearing together with the retinitis. In four days the sight was completely restored. According to Constantine Paul,³_{Dec. 30, '91} the experiments of Desnos with methylene blue in cases of locomotor ataxia have shown that patients can, without inconvenience, take as much as 0.30 gramme ($4\frac{1}{2}$ grains) of the drug daily, and that even when it was given in smaller doses the urine was intensely colored. Paul found that a dose of 0.10 gramme ($1\frac{1}{2}$ grains) colored the urine until the third

day. After a dose of 0.05 gramme ($\frac{3}{4}$ grain) the urine was still colored on the following day, and even to a slight degree on the day after. Gradually lessening the dose, he found that after 0.02 gramme ($\frac{1}{3}$ grain) the urine was distinctly colored, and had not entirely regained its normal appearance the next day. Methylene blue being absolutely harmless, the author thinks that its administration affords a reliable means of satisfying one's self whether patients are taking the remedies prescribed for them, which may be of practical use in prisons, lunatic asylums, and other institutions. He further suggests that the drug may also be employed by way of "suggestion" in order to convince neurotic patients of the efficacy of the treatment which they are undergoing, and as a useful *placebo* when the practitioner wishes to try the expectant method without taking the patient or his friends into his confidence.

E. Boinet and P. Trintignan⁴⁶_{Sept.1} have used methylene blue in the treatment of malarial disorders, blennorrhagia, pleurisy, adenitis, endometritis, and typhoid fever, apparently with good results. The authors conclude that the drug acts on the microorganisms, diminishing their vitality and virulence. A similar action may be said to occur in the case of the gonococci of blennorrhagia. In the treatment of malarial cases in which quinine had failed, methylene blue gave good results, especially in cases of recent date. In chronic malarial poisoning it did not act as well, although an appreciable amelioration was obtained. The exacerbations would return, but were less intense and farther apart. In therapeutic doses, the drug did not produce an untoward action on the digestive tract or the kidneys. It was, in fact, well tolerated. In rebellious cases the doses can be increased without inconvenience, and these quantities may give excellent results in obstinate fevers. In recent blennorrhagias injections of methylene blue are advantageous and not very painful. In the treatment of tuberculosis the medicament is not so effective.

Diakonoff⁹⁹_{Aug.18} reports three cases of inoperable new growths treated by injections of an aqueous solution of methyl-violet,—at first, 1 to 1000; and later, 1 to 300. The author believes that the substance has the power of destroying malignant new growths, and that, though its action is not energetic, its use is free from danger. It is indicated only in cases which are not operable. From an

interesting review of the therapeutic ⁶²_{Dec., '91} uses of pyoktanin, with the publication of several cases to illustrate the action of the drug in surgical diseases of the eye, Rescoussie draws the following conclusions: (1) Pyoktanin is an excellent antiseptic in surgical diseases of the eye, preferable to all other remedies; (2) the drug exercises a favorable action on simple conjunctivitis, and especially on granular conjunctivitis; (3) it is of doubtful efficacy against rebellious ulcerations of the cornea, and almost worthless in purulent ophthalmia.

S. Orloff ¹⁰⁴⁶_{May} has made a series of experiments in the use of methyl-violet, or blue pyoktanin, in equine and canine affections, such as wounds, ulcers, abscesses, eczema, and the like. The drug was employed invariably in the form of aqueous solutions, their strength ranging between 1 in 3000 and 3 in 100. The author arrives at the following conclusions: 1. Pyoktanin does not inhibit suppuration, and generally does not produce any favorable impression whatever on the course of wounds, abscesses, and ulcers. Weak solutions do not show any effect beyond staining, while a 2- or 3-per-cent. solution can give rise to considerable irritation. In several cases of wounds the application was followed by inflammation of the granulating surface. In three cases of simple ulcers there appeared an extremely painful fungoid vegetation, while in two other cases the edge of the ulcer became very callous. 2. Comparatively better results are observed in cases of moist eczema, because in these two or three applications of a 3-per-cent. solution may induce an improvement with the formation of a dry scurf. The same results, however, can be obtained by painting with a strong solution of nitrate of silver or an alcoholic solution of corrosive sublimate containing ether and glycerin. 3. The drug is by no means innocuous. In two cases of extensive moist eczema in dogs (in which the patients had licked up the pyoktanin solution after its application) there developed toxic symptoms, consisting in dilatation of the pupils, profuse salivation, muscular tremor, skittishness, and extremely obstinate vomiting. 4. On the whole, the drug does not present any advantages whatever. As an antiseptic, it cannot be even remotely compared with corrosive sublimate, carbolic acid, or iodoform, while it is apt to exercise an unfavorable influence on the course of wounds or ulcers. In addition, pyoktanin stains everything with which it comes in contact, a circum-

stance which is especially inconvenient, on obvious grounds, in the case of pet dogs. Our corresponding editor, Moncorvo, of Rio de Janeiro, ⁶⁷³_{Oct.} has experimented with pyoktanin on children, in order to determine the antiseptic properties of the drug. Of the different pyoktanins, he gives preference to auramin, or yellow pyoktanin. In many cases of syphilitic ulcerations the application of the powder has seemed to hasten cicatrization, the patient meanwhile, however, taking mercury and the iodides. The use of pyoktanin-pencils in fistulous tracts left in incompletely cicatrized abscesses gave good results. No toxic effect from absorption of the drug was observed.

Animal Extracts.—That spermatotherapy is progressing in France is apparent from a recent contribution by Brown-Séquard, ⁹¹⁶_{v. 114; July} ⁹⁸ who details his own experience and that of others. Out of thirty-nine cases of locomotor ataxia treated by the injection of testicular fluids, thirty-one were either greatly benefited or completely cured. The other eight cases received no benefit or a very slight one. Success was also reported in the treatment of tuberculosis, diabetes, anæmia, neurasthenia, and numerous affections associated with nervous debility. Cases of myxœdema were treated by injections of the juice extracted from the thyroid gland, with cure in three cases after a treatment of ten days. It is also stated that Addison's disease is being combated in a similar manner with a liquid obtained from healthy supra-renal capsules and with that furnished by the testicles of rams. Improvement follows after a few days of treatment, but the bronze color of the skin undergoes no change. It seems that in France the profession have accepted with enthusiasm the method proposed by the author, and that the new treatment is becoming more and more generally used. A cure of locomotor ataxia in a fencing-master was reported to the Société de Biologie, June 4th, ³_{June 8;} ²_{June 25} as an example of the action of testicular juice hypodermatically injected. The muscular energy, the precision, and strength of the movements, as also the power of resisting fatigue were remarkable in the patient, who was practically restored to full health. Another case of the same nature, in a soldier, was reported by Depoux. This patient was completely cured by the treatment in the course of five months, although his patellar reflexes still remained absent. A third similar case was stated by Brown-Séquard to have been cured by

Gibert, of Havre. Brown-Séquard further stated that Owspenski, of St. Petersburg, informed him of cures or marked improvement in twenty-nine out of thirty-six cases of locomotor ataxia treated with the testicular juice.

A chemical examination of the testicular juice has been undertaken by Poehl,⁷⁴⁰_{Sept.3} whose observations have been communicated to the Académie des Sciences. The author has been able to recognize, besides lecithin, nuclein, and numerous leucomaines, a considerable proportion of spermin. The action of spermin, which is a tonic and nervine, is explained, according to Poehl, by oxidating processes, during which the extractives disappear. Thus, the more rapid the oxidation of the leucomaines, the more complete the disappearance of extractives, and hence the sensation of general *bien-être* which patients experience, and which most clinicians have observed. Pulawski,⁶⁷³_{Jan.} who has given some attention to the subject, believes that no definite idea can yet be formed in regard to the method of treatment proposed by Brown-Séquard. This writer and many other physicians who have employed the method in practical medicine have supposed that the injections produced tonic and excitant effects, the various observations numbering over three hundred. Pulawski himself has made a series of clinical observations at the Child Jesus Hospital, at Warsaw, on twelve patients, the diseases comprising three cases of marasmus senilis, two of tabes, two of impotentia virilis, arthritis deformans, dyspepsia nervosa, enuresis nocturna, convalescence from typhoid fever, and even one case of nephritis. From the results obtained, he draws the following conclusions: (1) local pain and abscess developed twice; (2) fever, with chills, appeared very frequently, with excitement (which was also observed by other clinicians); (3) specific action was never observed; (4) subjective and positive amelioration were dependent upon suggestion. He mentions one case, however, in which the typical symptoms described by Brown-Séquard were noticed after injecting milk. Pulawski warns against the use of spermin as it appears upon the market, on the ground that it is unreliable.

Capriati,⁵⁸⁹_{July 8} also, has studied the therapeutic effects of the injections of testicular juice; first in four cases of insanity, the patients suffering from acute forms of mental disease, with depression; and next in healthy persons. In the former series of cases,

after sixteen days of treatment, no real modification of the morbid state, bodily or mental, was ever observed. In all of them, however, throughout the treatment, and especially in the first few hours immediately following an injection, a definite effect was clearly produced on the cardio-vascular apparatus. This consisted in the strengthening of the heart's impulse and an increased tonicity of the walls of the blood-vessels. These effects ceased on the discontinuance of the treatment. In the case of the healthy patients, it was chiefly the effect on the muscular power that was studied; the results were entirely negative. From these experiments, Capriati concludes that the testicle-juice has no dynamogenic influence on the nerve-centres, its effect being limited to temporary stimulation of the nervous system. He attributes the wonderful effects reported by other observers not to the action of substance, but to the influence of a powerful psychical factor such as suggestion. Other papers bearing upon the subject of Brown-Séquard's method of treatment may be found as follows: Henri-jean²⁹³_{Mar.}; W. D. Waterhouse²_{Jan. 30}; A. G. Bagroff⁵⁸⁶_{No. 9}; Bra²⁹⁰_{Feb. 23}; Ernest Magnant⁶⁷_{Dec. 30, '91}; H. F. Meier, of California⁷⁷_{Sept.}; and Jules Dauriac, of Paris.¹⁰⁰_{July 2}

Following the researches of Constantine Paul, Marechal²⁸⁸_{May 8} has practiced injections of nerve-substance, without having observed a single instance of local inflammation. The material employed was carefully-prepared cerebral substance, ten days old. The patients experienced a slight sensation of heat for about ten minutes after the injection. The reaction was characterized by only a little cerebral excitation on the day of the injection and on the following one, and there was no increase in the body temperature. The treatment was employed in cases of chloro-anæmia, chlorosis, neurasthenia, and ataxia. In three cases of cerebral neurasthenia the most favorable results were obtained. One of the cases was that of a literary man, who, as a consequence of intellectual overwork, suffered terribly from loss of memory, headache, pain over the lumbo-sacral region, lumbago, marked muscular asthenia, constant fatigue, insomnia, frequent seminal emissions, loss of sexual appetite, gastro-intestinal atony, and pronounced depression of spirits. Two injections were employed weekly, beginning with 1 cubic centimetre (15 minims) each, and with the gradual increase of 1 cubic centimetre (15 minims) each time.

After the third injection—that is, after 3 cubic centimetres (45 minims) of the remedy—had been administered the patient complained, in the morning, of only slight headache and lumbago. The following night he slept well; in the morning he felt better, and noticed that the lumbar pain had disappeared. The patient afterward received eight injections a week, of 5 cubic centimetres (80 minims), a complete transformation having occurred in the meantime. Sleep had become normal, intellectual work was now easy, and the return of the usual gay spirits of the patient was a special feature. The other cases, with few exceptions, were similar in nature, and the same happy results were obtained. Favorable results are also claimed to have been observed in functional disorders of the nervous system. Marechal has many ataxic cases under the new treatment, two of which he affirms have been benefited. F. Altamirano, of Mexico, ¹⁷⁹_{July 1} has reported a case of pernicious anæmia apparently ameliorated by the subcutaneous injections of serum prepared from the blood of the dog, the doses being 5 cubic centimetres (80 minims) each. The patient experienced great relief; her strength improved, and other disagreeable symptoms, such as insomnia and delirium, were lessened. Other medicaments, however, were combined with the injections, such as iron, strychnine, and arsenic, together with electric and lukewarm-water baths.

Behring, ⁶_{July 23} well known for his studies on immunity against traumatic tetanus and diphtheria, has endeavored to prove, in a recently-published treatise, that the blood-serum of animals rendered immune by treatment with cultures acted on by trichloride of iodine cures other animals infected by disease and renders healthy ones immune. He has applied successfully such a method in traumatic tetanus and diphtheria, and now says that one of his co-laborers has been equally successful in diseases caused by streptococci.

Antifebrin.—See Acetanilid.

Antimony.—Harnack, ³¹_{Mar. 18} says that antimony has been superseded by other drugs in almost all instances. Apomorphine has supplanted it as an emetic, although one disadvantage of apomorphine is the collapse sometimes produced by it. As a diaphoretic there are many more suitable agents, and antimonial preparations have been quite abandoned in the treatment of fevers,

owing to the cardiac depression produced by them. Harnack thinks that there is no sufficient reason for continuing the use of tartar emetic.

Antinervin.—It is stated⁶_{Feb. 13} that antinervin was employed efficaciously in a recent epidemic of influenza in Glogaw. The drug, it was observed, alleviated the pains in the head and back, and caused lowering of the body temperature, accompanied by copious perspiration. No untoward effects were noticed. Eight powders of $\frac{1}{2}$ gramme ($7\frac{3}{4}$ grains) each, taken in two days, were generally sufficient to arrest the disease. The remedy appears also to have given satisfactory results in the Royal Clinics of Turin and Genoa. It has also been recommended by Laurenti¹⁵²_{July 15} as a succedaneum of antipyrin, as a specific against neuralgias, and in articular rheumatism. The author believes it to be useful, besides, in febrile diseases, such as typhoid fever, tuberculosis, pneumonia, and others. He has used it in fifty cases, the majority being of influenza, some of rheumatic polyarthritis, and one of chorea. The initial dose employed was 0.50 gramme ($7\frac{3}{4}$ grains) given in cachets, repeated four times in the course of the day; and, later, as much as 4 grammes (62 grains) were administered in the twenty-four hours. In robust persons he has given 1 and even 1.5 grammes ($15\frac{1}{2}$ and even $23\frac{1}{4}$ grains) at a single dose. The author observed, in the patients treated with the drug, after the ingestion of the first two doses, an amelioration of headache, lumbar pains, myalgias, and gastralgiæ. The temperature was lowered from 1° to 1.5° C. (1.8° to 2.7° F.). The drug was of no avail in chorea. As a whole, the best results were obtained in influenza and in articular rheumatism.

Antipyrin.—Saint-Hilaire and Coupard¹³⁶_{No. 22, '90; Jan. 11} have called the attention of the Société de Laryngologie, d'Otologie, et de Rhinologie to the anæsthetic properties of antipyrin. They have employed the drug in affections of the throat and larynx, and found that all symptoms of exaggerated sensibility have disappeared under its use. Its anæsthetic effects were corroborated by experiments on the lower animals. The same observations have been made by other authors, notably G. Sée, Gley, and Caravias. The drug appears to be indicated when prolonged anæsthesia is required, as in tuberculous affections and in those in which the reflex movements predominate. Saint-Hilaire employs the follow-

ing solution: antipyrin, 4 grammes (1 drachm); distilled water, 10 grammes ($2\frac{1}{2}$ drachms). To prevent the smarting that this solution produces, he recommends the addition of cocaine, in amounts of from 0.15 to 0.25 gramme ($2\frac{1}{4}$ to 4 grains). The author believes that for a prolonged analgesia antipyrin is to be preferred to cocaine.

In a discussion before the Medical Society of Lyons, Clément ²¹¹_{Feb. 22} maintained that the actions of antipyrin may be divided into five groups: 1. As an analgesic against pain. 2. As an antithermic, differing, according to some authors, from its antipyretic action. In such instances the drug is usually employed when there is a condition of hyperthermia. 3. As a specific in the treatment of rheumatism and gout. It is generally indicated in all varieties of rheumatism and in all those acute diseases in which arthritism is a prominent symptom. 4. As an antipyretic, especially in all infectious diseases. 5. As an empirical remedy in certain disorders, such as exophthalmic goitre, diabetes, chorea, and others. It has been erroneously held that antipyrin irritates the kidneys and provokes nephritis. Clément believes that the drug modifies the secondary nephritis occurring in the infectious diseases, and that such an inflammation disappears, together with the acute processes of the malady, in patients treated with antipyrin. He has administered the medicament with success in a case of scarlatinous eclampsia. He has observed that it notably increases the muscular force, not only in febrile patients, but also in apyretic individuals. In febrile cases this increase is more noticeable on the day following the fever, and in these cases the result may be attributed to a diminution of the febrile process. In apyretic patients, the increase of the muscular force, though less marked than in the preceding instances, is present, and it is then dependent on a tonic action exercised upon the muscular system. In chorea the drug increases the arterial pressure, and to a similar action are attributed the good effects produced by the remedy in asthma, emphysema, and pulmonary catarrh. The author believes that antipyrin acts also as a tonic to the muscles of respiration. Angel M. Centeno ⁹²⁵_{Dec., '91} believes that antipyrin is the analgesic *par excellence*.

Martin ¹⁷_{Nos. 125, 126, 128; July 16} ¹⁹ states that, besides being antipyretic, the remedy possesses other properties equally valuable. It is serviceable

as an anti-hæmorrhagic and antiseptic in epistaxis and coryza, in which disorders solutions of 1 to 5 and 1 to 30, respectively, are used. Its value in laryngeal affections, such as catarrhs, laryngismus stridulus, in asthma, broncho-pneumonia, and pleuritic effusions, is undisputed. As an antigalactagogue, it has given good results in doses of from 10 to 20 grains (0.65 to 1.3 grammes). It has rendered good service in incontinence of urine, diabetes insipidus, and diabetes mellitus,—in the two latter diseases in daily doses of 1 drachm (4 grammes). In uterine cancer, dysmenorrhœa, and even in parturition, antipyrin has relieved pain. It has proved beneficial in exophthalmic goitre, nocturnal pollutions, pains of tubercular meningitis, hemeralopia, asthma (whether essential or of cardiac origin), distress of aortic aneurism, etc., and in infantile diarrhœas. Combined with cocaine, it has relieved obstinate vomiting. It is also said to be beneficial in cutaneous diseases, particularly urticaria, erythema nodosum, and senile pruritus. Guibert¹⁸⁸_{Dec.13,'91} has collected nineteen instances in which antipyrin completely suppressed the secretion of milk. In this number are included both cases in which the child was suckled for a few days and those in which the breast was not given at all. Twenty-five to forty grains (1.62 to 2.59 grammes) of the drug were given daily, in doses of 5 grains (0.32 gramme) every two hours. No untoward effects were observed. G. Roux²¹¹_{Feb.14} asserts that antipyrin so modified the action of the *bacillus coli communis* as to destroy the power of this micro-organism to coagulate milk.

The following substances incompatible with antipyrin¹⁰⁴⁷_{No.29} are said to precipitate the drug from concentrated solutions: 1. Strong solutions of carbolic acid. 2. Tannic acid and preparations containing it. 3. Tincture of iodine. 4. The chlorides of mercury. The following are instances of mixtures in which the antipyrin is decomposed: 1. Calomel forms with antipyrin a toxic combination. 2. Antipyrin is decomposed when rubbed with beta-naphthol. 3. With chloral, antipyrin forms an oleaginous liquid. 4. With bicarbonate of sodium, it disengages the odor of ether. 5. Equal parts of salicylate of sodium and antipyrin form an oleaginous mixture.

G. S. V.²²_{Feb.3} describes the following untoward effects observed after the ingestion of two doses of antipyrin of 5 grains (0.32 gramme) each. The patient was a lad 12 years of age. Within

a quarter of an hour his face became flushed and swollen, the eyes seemed to project, and, when spoken to, he was quite unable to articulate, though he made several attempts to do so. The temperature had fallen from its abnormal height, but, far from appearing relieved thereby, his condition for some time caused the greatest anxiety. No rash was noticed on the body. The symptoms gradually subsided, without any special treatment; but it was some hours before he was himself again. A case of poisoning by antipyrin is reported by T. Sydney Short. ²_{June 11} A professional man took, on each of three different occasions during a period of twelve months, 5 grains (0.32 gramme) of the drug for the relief of headache due to fatigue. The remedy was mixed with a little water and swallowed. Each time, after a brief interval, he suffered successively from flushing of the face, unpleasant choking sensation in the throat, and redness and swelling of the nose and lips. These symptoms were followed by a herpetic eruption on the lips, nose, and inside the cheeks, and a similar condition of the skin of the penis and the scrotum. There was a feeling of stiffness, accompanied by pain on movement, about the neck, shoulders, and back; but there were no symptoms of collapse, no vomiting, and no effect on the temperature. The vesicles of the lips and nose discharged profusely, and those of the mouth were converted into painful ulcers. These symptoms soon disappeared under proper treatment, and desquamation occurred over the affected skin.

Apiolin.—This may be considered as the best emmenagogue known at the present time. It is indicated in amenorrhœa due to anæmia from whatever cause. W. A. Newman Dorland ⁷¹_{July} believes that, in order to insure the best results from the use of the drug, it is better to combine it with some preparation of iron. He suggests that iron be given uninterruptedly until a few days before the expected appearance of the menses. Then, continuing the iron, apioline should be prescribed in 5-minim (0.32 gramme) doses, three times a day, until the appearance of the menstrual discharge.

Apocynum Cannabinum.—This plant contains, besides tannic acid, gallic acid, and gum-resin, a bitter principle, which occurs in the market under the name of *apocynin*. M. E. Snow ⁵⁴⁷_{July} has employed apocynum in the treatment of general dropsy. He details three cases of this condition, of diverse origin, in which the most

remarkable results were obtained after all other modes of treatment known to him had signally failed. Two of the cases were practically cured, and the third was greatly relieved. The medication causes free diuresis, provided the kidneys be not affected by organic disease, and especially if it be given in small doses. It is also a good tonic, and, in large doses, possesses an emetic and cathartic action. The author employed the plant in the form of infusion, in doses of 1 ounce (31 grammes) every six hours. As adjuvants to the remedy, he recommends the administration of acetate of potassium and sweet spirits of nitre.

Apomorphine.—Ingram¹¹⁷_{Apr.} has reported some interesting cases in which he has employed apomorphine. A young woman, 25 or 30 years of age, was found drunk, hysterical, and hard to control. He gave apomorphine hypodermatically, in a single dose of $\frac{1}{10}$ grain (0.0065 gramme), after which the patient vomited freely, became relaxed, and rested quietly. A business man took a large dose of bromidia and became violently insane, requiring three men to control him, and tried to kill himself and others. Soon after receiving $\frac{1}{10}$ grain (0.0065 gramme) of apomorphine he vomited, had a movement of the bowels, his mental condition was relieved, and he slept well the remainder of the night. The author has used apomorphine in one case of epilepsy,—that of a woman aged 40 and cataleptic. The remedy acted well. He has also employed it in intestinal colic. In a very severe attack he states that he gave $\frac{1}{10}$ grain (0.0065 gramme), which caused the patient to vomit, with marked relief, about 1 gallon (4 litres) of partially-digested food. He has similarly used the remedy in whooping-cough to relax spasmodic attacks. He employed it in one case of eclampsia without effect.

Arasa.—According to the observations of physicians from Montevideo,^{209 673}_{No. 52, '91; Oct.} this plant, whose natural habitat is Brazil and Uruguay, is said to be an excellent remedy for metrorrhagia, being effectual in cases in which even *hydrastis Canadensis* has been of no avail. The active principle of the drug is found in the root. Two grammes (31 grains) of the bark of the root, boiled in a cupful of water, are given for several days preceding and during the menstrual period. The taste of the drug resembles that of *cascarilla*. No untoward effects have been observed by those who have studied the plant,

Aristol.—R. Y. McCoy¹⁹⁸_{Dec., '91} reports a case of excessive suppuration of the legs, knees, and soles of the feet, occurring in an engineer as the result of scalding. An ointment of aristol changed the appearance of everything in twenty-four hours, and from this time healing continued steadily and rapidly, and almost a complete cure was obtained in ten weeks. Attention is called¹⁴⁴_{Aug.} to the fact that no record is yet found of the drug having been used to prevent the ulceration and pitting of variola. The suggestion is worth considering.

Aristol has been used by our corresponding editor, Moncorvo, of Rio de Janeiro,⁶⁷³_{Oct.} in his service at the Policlinique Générale. He has used the remedy externally in more than one hundred cases of infantile disease, and internally, in cachets, in the case of tuberculous children, in maximum daily doses of 0.40 gramme (6 grains). In all these cases it proved a perfect substitute for iodoform, over which it has the advantage of being both tasteless and odorless. When given internally it produced no untoward symptoms; as an antiseptic it did not appear to be in any way inferior to iodoform; it diminished suppuration and hastened the cicatrization of wounds and ulcers; it was found of great value in many infantile skin diseases; finally, it was in every way an efficient substitute for iodoform.

Arsenic.—Hutchinson⁸⁰⁶_{Apr.} has long held that arsenic, used for a considerable period, produces a tingling and numbness of the tips of the fingers, and mentions, in corroboration of this, the case of a patient who experienced this symptom after a long course of arsenical medication, the sensation disappearing when the remedy was discontinued.

Asaprol.—Stackler,⁶⁷_{May 15} who has made a special study of this new compound, says that it is the mono-sulphonate of naphthol, the word "asaprol" being derived from the Greek and signifying "to prevent putridness." It is neutral in reaction, readily soluble in alcohol and water, not altered by heat, non-irritant, slightly toxic, and well borne by the digestive tract. It is rapidly eliminated by the kidneys. It produces no local irritation in rabbits when hypodermatically injected. Asaprol is also a germicide, and the author asserts that it arrests the development of the streptococcus aureus, the pyocyanine bacillus, and the micro-organisms of Asiatic cholera, herpes tonsurans, typhoid fever, and carbuncle; that, in

doses of from 1 to 4 grammes ($15\frac{1}{2}$ to 62 grains), it has acted advantageously in many forms of rheumatism in adults, often producing an increase in the amount of urine and never a diminution. It has likewise been found useful as an antithermic in typhoid fever and other infectious states. In a later communication, ¹⁵²_{Sept. 23} the result of continued careful clinical studies with the drug, he details numerous cases of various disorders in which it produced the most satisfactory results as an antithermic and intestinal antiseptic. In typhoid fever, it diminished the body temperature and allayed the cerebral symptoms. In influenza, it acted effectively after quinine and antipyrin had failed. In three cases of pneumonia, accompanied by high fever and delirium, asaprol cured promptly. Several cases of acute tonsillitis in adults and children rapidly yielded to the action of the remedy. It was also of service in the treatment of boils and infectious diseases accompanied by albuminuria, the albumen soon disappearing from the urine. As an analgesic, it was found successful in sciatica, intercostal neuralgia, *tic douloureux*, in the pains of muscular rheumatism, and even in those occurring in the lower extremities of alcoholic patients. In three cases of asthma the new agent relieved two and produced a rapid cure in one. Asaprol was found particularly useful in the treatment of acute and subacute articular rheumatism. One case of rheumatic polyarthrititis, occurring in a young servant-girl 17 years of age, was cured in twenty-four hours; and another case of the same nature, in a man aged 32 years, was cured in an equally short time. The drug was, in these cases, as valuable as the salicylate of sodium. The author refers to fourteen other acute cases, in which it produced the same happy results. Seventeen cases of the subacute disorder yielded completely in from three to four days. He affirms that, in the majority of cases of acute and subacute articular rheumatism, asaprol is an excellent remedy, and is well borne, even by patients suffering from derangements of digestion, and who are unable to take antipyrin or sodium salicylate. In only two instances did the drug produce a slight nausea. In the majority of instances it is better to begin with doses of from 2 to 4 grammes (31 to 62 grains), which may be increased according to the requirements of the individual case. Asaprol never produced cerebral troubles, vomiting, or other untoward effects. It was administered with success in patients

suffering at the time with vomiting and diarrhœa. It frequently caused an increase in the amount of urine voided in the course of twenty-four hours. In many cases of rebellious chronic rheumatism, or of rheumatism accompanied by successive attacks of a subacute character, asaprol did so much good that patients asked for the remedy when its administration had been suspended. In this condition it allayed the pains, although it produced no cures. The observations of the author have been confirmed by Dujardin-Beaumetz. Stackler prescribes asaprol in cachets of from 0.5 to 1 gramme ($7\frac{3}{4}$ to $15\frac{1}{2}$ grains) each, or in 5-per-cent. solution. It may be administered in beer, coffee, anise-water, etc. Solutions of the strength of from 2 to 5 per cent. may be employed for gargles, or for vaginal, urethral, and rectal injections. Ointments of the strength of 1 part in 3 are also used. The author concludes his excellent contribution by remarking that asaprol is incompatible with the salts that precipitate lime, the soluble sulphates, bicarbonate of sodium, and the iodide of potassium.

Asclepias Syriaca.—The therapeutic properties of this plant, especially in the dropsies of renal origin, are lauded by Geo. D. McGaubran.¹⁰⁴⁸ Apr. He reports the case of a laborer, suffering from abdominal dropsy, the result of Bright's disease, and two of a similar affection in children, the sequel of scarlet fever, in all of which the drug acted marvelously. He claims to have treated, with satisfactory results, several other cases of the same nature. The plant may be given in the form of a decoction or a tincture, in doses of 2 ounces (60 grammes) and 1 to 2 drachms (3.69 to 7.38 grammes), respectively, five or six times a day.

Asepsin.—This drug is highly lauded by John Fearn¹⁹² June as one of the best aseptic remedies, superior to carbolic acid, corrosive sublimate, and iodoform. He has employed it, with excellent results, in the treatment of nasal catarrh and of indolent ulcers of the extremities. For the first affection a spray of a solution of the remedy was followed by the local application in the nostrils, several times a day, of the following mixture: pomade of juniper, 1 ounce (31 grammes); asepsin, 3 grains (0.19 gramme). The same ointment can be used with advantage in the dressing of foul-smelling ulcers. The best results, however, have been obtained by the writer in gynæcology, where asepsin was given as a vaginal douche for leucorrhœa. In these cases he prepares the solution of

asepsin as follows: Take of asepsin, 1 drachm (3.89 grammes); glycerin, 2 ounces (62 grammes); place the asepsin in a mortar, add the glycerin slowly and triturate, mixing well. Now dissolve 1 drachm (3.89 grammes) of borate of sodium in 6 ounces (177 grammes) of distilled water, and then mix the two, shaking the preparation thoroughly. The same combination may be used in the form of a spray for catarrhal conditions of the head and throat and in purulent conjunctivitis. For a uterine wash, 1 ounce (30 grammes) of the mixture in 1 pint ($\frac{1}{2}$ litre) of hot water is of value. The author has also used the new medicament internally in gastro-intestinal disorders, such as cholera morbus, cholera infantum, dysentery, etc. As a tonic and antiseptic in such cases he has used successfully the following: tincture of nux vomica, 15 drops; borated solution of asepsin, 3 drachms (11.08 grammes); distilled water, sufficient quantity to make 4 ounces (118 grammes). Of this mixture, 1 drachm (3.69 grammes) is given every three hours.

Asparagin.—See *Asparagus Officinalis*.

Asparagus Officinalis.—At a meeting of the Russian Medical Society, at Novotcherkask, A. Aksuetina²²⁹_{Feb.} showed some specimens of the wild *Asparagus Officinalis*, which in that country is called “sparja,” and is used in the domestic medicine of Russia as a popular means of arresting flooding. She narrated a case from her own experience, in which the drug had been employed with good results. In a multipara, who had missed her menses once, there suddenly appeared metrorrhagia of a moderate intensity, which did not yield to treatment by cold-water injections and absolute rest. After two and a half weeks, the patient, following the suggestion of a friend, resorted to an infusion of asparagus, made of a handful of the herb to two cupfuls of boiling water, one teaspoonful of the infusion being taken in the morning and another in the evening. The hæmorrhage gradually ceased before night came, and on the next morning a four weeks’ fœtus, in a semi-putrid state, was expelled. Aksuetina thinks that in the above case the infusion of asparagus caused an energetic contraction of the atonic uterine muscular fibres, and thus enabled the womb to complete the separation of an already semi-detached ovum. The hydrargyrate of asparagin, in $\frac{1}{2}$ -per-cent. solution, appears as a limpid, odorless liquid, having an acrid, sharp, metallic

taste. This aqueous solution has been employed hypodermatically by Neumann^{1049 673}_{No. 8; Aug.} in thirty-seven cases of syphilis. The results were satisfactory. The injections, which were painless and well borne, were repeated daily. The absorption of the combination is more rapid than that of other preparations of mercury, and this makes it of value where a rapid action is desired. It was found that by twenty-four hours after the injection a large portion of the drug had been excreted. The initial dose was $\frac{1}{6}$ grain (0.011 gramme). Justin D. Lisle¹_{July,} details the case of a healthy man, in whom the ingestion of asparagus caused the urine to respond to the best-known tests for detecting sugar, such as Trommer's, Fehling's, and Böttger's. The writer experimented upon himself and eight other persons with the same results. In all of these instances, however, the urine failed to show the presence of sugar when subjected to fermentation; and this logically leads the writer to the conclusion that the ingestion of asparagus does not cause saccharinity of the urine, but that a substance is formed and excreted which causes a response to the reactions used by physicians for detecting sugar, except the test by fermentation.

Atropine.—See Belladonna.

Bailahuen.—The therapeutic uses of this plant, the *Haplopappus bailahuen*, were communicated to the Chilean Medical Congress by Carvallo and Eisele.⁹²⁵_{Mar.} The drug is used in the form of an infusion, of the strength of from 15 to 30 grammes (4 to 8 drachms) to 250 grammes (8 ounces) of water, and in doses of from 1 to 2 tablespoonfuls every two hours. The best preparation, however, is the fluid extract, which can be administered in doses of 20 minims (1.33 grammes) in sweetened water, or according to the following formula: fluid extract of bailahuen, 5 grammes (80 minims); simple syrup, 30 grammes (1 ounce); distilled water, 170 grammes ($5\frac{2}{3}$ ounces). Of this, a tablespoonful every two hours is given. The taste of the medicament is somewhat bitter and aromatic. The drug does not possess poisonous properties, and produces no untoward effects. It is chiefly used in the treatment of diarrhœa and dysentery. Of 32 persons suffering from the last-named disorder and treated with it, a complete cure was effected in 25 cases; improvement was observed in 3 cases; in 3 other cases the remedy failed, and 1 patient died. The duration of the treatment was ten days. Fourteen observations were

made in diarrhœa; the drug produced the most satisfactory results in 11 cases, but failed in the other 3. The duration of the treatment in these instances lasted from five to ten days.

Balsam of Peru.—From a study of this substance, Landerer¹⁰³⁵
June 20 concluded that the active agent was cinnamic acid, as the results obtained were in direct proportion to the amount of the acid present. He finally used the acid alone, in the form of the following emulsion: cinnamic acid, 5 parts; oil of almonds, 10 parts; yolk of egg, 1 part; sodium chloride (0.7-per-cent. solution), sufficient to make an emulsion of 100 parts. This emulsion was rendered alkaline before use by the addition of sufficient of a 25-per-cent. solution of potassium hydrate. Of 18 cases of internal tuberculosis treated by the intra-venous injections of the emulsion, 9 recovered, 6 improved, 1 did not improve, and 2 died. He recommends that from 0.1 to 1 cubic centimetre ($1\frac{1}{2}$ to $15\frac{1}{2}$ minims) of the emulsion be injected into one of the brachial veins, previously distended and kept distended for twenty minutes after the injection. With perfect antisepsis no bad results follow. Some patients show temporary cephalalgia, sleeplessness, and other symptoms, but they soon recover. The treatment should be persisted in for six or nine months, and long after the time of apparent recovery. Of 45 cases of surgical tuberculosis treated by local injections, 31 were cured, 7 improved, 1 was not helped, 2 died, and 4 are still under treatment. The aim of the author was to bring the acid in contact with the tubercular lesion and its environments. In the treatment of lupus he used the following alcoholic solution: cinnamic acid, 1 part; hydrochlorate of cocaine, 1 part; rectified spirits of wine, 20 parts. Of this solution he injected 1 or 2 minims (0.06 or 0.12 gramme) about each nodule, making as many as ten injections at each weekly *séance*.

A case of poisoning by balsam of Peru, occurring in an infant 6 days old, is recorded by Lohaus.^{4 9}
No. 6; Mar. 26 The child was seized with convulsions, and, when first seen by the author, was crying, covered with sweat, and evidently in great distress. The following marked symptoms were noted: the stools were thin, greenish, and contained mucus; the skin was moist; the lips cyanotic; a brownish, viscid mucus, of a peculiar ethereal odor, exuded from the mouth; the pulse was rapid and feeble; the pupils small. The author believes that the child was evidently

poisoned by the drug, which, it was learned afterward, the mother had been applying for sore nipples, these being simply wiped before nursing. No doubt the quantity absorbed by the child with the nourishment was sufficient to produce an intense gastro-intestinal catarrh.

Barium.—The toxicity of the salts of barium has been compared to those of strontium, by Bardet, who publishes ²⁹⁶_{Dec. 24, '91;} ²_{Feb. 13} the results of many experiments performed to elucidate this question. From a number of such experiments on rabbits, he comes to the conclusion that these animals will bear doses of 0.8 gramme ($12\frac{1}{2}$ grains) per kilo ($2\frac{1}{5}$ pounds) of body-weight without more than temporary malaise. Larger doses, however, are violently toxic, and smaller amounts produce practically no bad effects. Taking the minimum quantity which has produced death in man, one finds that this was about 4 grammes (62 grains) in a woman weighing about 50 kilogrammes (110 pounds). This would tend to show that the toxic dose in man and rabbits is about the same. Should this reasoning be correct, it would be quite safe to give as much as 1 gramme ($15\frac{1}{2}$ grains) of barium chloride. From a titration of various specimens of commercial strontium salts, the author has found that they all contain appreciable amounts of barium as impurity; but recently the purification has been much improved, and they may now be obtained containing not more than 1 to 1000 of barium; in other words, 15 grammes (4 drachms) would contain not more than 0.015 milligramme ($\frac{1}{4}$ grain) of the barium salt.

Belladonna.—After briefly reviewing the physiological action of the plant, E. Curtis Hill¹⁵⁵_{July} mentions the principal complaints that he believes to be especially benefited by the remedy, as follows: Cerebral and spinal hyperæmia; meningitis; congestive headaches; neuralgia in all forms and locations; muscular cramps; pain of inflammation; chest-pains of phthisis; colic; all kinds of nervous cough; asthma; convulsions; superficial or cerebral erysipelas; sore throat, with fever, inflammation, and swollen tonsils; local inflammations generally; adynamic scarlet fever; enuresis of children; nocturnal emissions; pyalism of pregnancy or mercury; sweating of phthisis; rheumatism and rickets; menorrhagia; hæmoptysis; aphonia of fatigue; mitral regurgitation, with failure of cardiac compensation. As a local application, he believes it to

be of the greatest service in the treatment of many neuralgic and rheumatic pains; in dysmenorrhœa due to stenosis of the cervix uteri; in threatened mastitis; excessive sweating, pruritus, hæmorrhoids, fissure of the anus, abscesses, and a rigid os uteri in labor. The hypodermatic use of the active principle, atropine, he classes as a life-saving expedient in collapse from ether or chloroform narcosis. From the well-known fact that children bear belladonna remarkably well, the author recommends the ingestion of as much as $\frac{1}{2}$ or 1 drachm (1.875 or 3.75 grammes) of the tincture in the twenty-four hours, in the treatment of enuresis. M. D. Soble⁵⁹_{Jan. 2} says that full doses of atropine diminish blood-pressure by dilating the peripheral systemic vessels. In this indirect way they lower the tension on the pulmonary arterioles. Small doses have an effect more or less contrary to this. In severe hæmoptysis the author gives enough atropine hypodermatically to produce full dilatation of the pupils as rapidly as possible. This may be $\frac{1}{60}$ grain (0.001 gramme), repeated, if necessary, in an hour. The later doses may be combined with a little morphine to check the cough. He has used this treatment four times, with apparent success.

Two cases in which atropine acted well as a hæmostatic are related by A. N. Dmitrieff.⁵⁸⁶_{No. 50, '91; May 28} One was that of a metrorrhagia of a fortnight's standing, the patient having been previously treated in vain by ergot internally, plugging, etc. The bleeding completely ceased after four injections of $\frac{1}{200}$ grain (0.00032 gramme) of atropine, given twice daily. The other patient was suffering from severe menorrhagia. Persistent internal administration of ergot and hydrastis Canadensis, ice locally, and other measures having failed, a syringeful of an atropine solution (0.003 gramme— $\frac{1}{20}$ grain—of the sulphate to 10 grammes—2 $\frac{1}{2}$ drachms—of distilled water) was injected under the skin. A marked general improvement followed in half an hour. After a second dose, five hours later, the bleeding considerably lessened, and, after the third and last (twelve hours subsequently), ceased altogether. Only trifling dilatation of the pupils was produced. Strizover⁵³⁰_{No. 6; May 28} reports 5 cases of profuse hæmorrhage (1 of metrorrhagia after early abortion; 3 of flooding, of obscure origin; and 1 of phthisical hæmoptysis) cut short by hypodermatic injections of $\frac{1}{60}$ grain (0.001 gramme) of atropine. In the case of abor-

tion, occurring in a woman aged 26 with aortic regurgitation, digitalis internally, cold to the cardiac region, plugging the vagina with salicylated cotton-wool, and intra-uterine injections of tincture of iodine, and, later on, of perchloride of iron, had all been previously tried in vain. After three injections of atropine—one in the evening, another three hours later, and the third in the morning—the hæmorrhage ceased, and the patient made a good recovery.

Leszynsky has published¹⁰⁸_{May} a case of muscular torticollis, which was successfully treated by hypodermatic injections of atropine. The patient was a painter, 37 years of age, in whom the affection developed without appreciable cause, perhaps under the influence of lead poisoning. The contractions were exaggerated by the movements of mastication and by the closing of the jaw, and even awakened the patient from sleep. Near the right angle of the mouth there was a point of complete anæsthesia. After having used various internal remedies and electricity without effect, the author made injections of atropine, beginning with $\frac{1}{200}$ grain (0.0003 gramme), and increasing gradually to $\frac{1}{48}$ grain (0.0013 gramme). The cure was complete after eight injections. The author mentions a case of convulsive tic, in a woman of 50 years, in which similar injections produced decided amelioration.

A case of poisoning from the local application of belladonna is reported by T. J. Walker, of London,²_{Nov. 28, '91} as occurring in a woman 65 years of age. When first seen by the writer the patient was lying unconscious, with occasional muttering delirium, answering incoherently when roused. The limbs were rigid, with convulsive twitchings, arms flexed, the clenched hands pressed against the throat, pupils widely dilated, urine retained. The symptoms had commenced, twenty-four hours before, with giddiness and staggering gait; this was followed, after an interval, by delirium, complete loss of power, and unconsciousness. The poisoning was caused by a belladonna plaster used over the back. The patient made a rapid recovery, under the influence of morphine, after having been thoroughly catheterized. (See also Opium, for antagonistic action.)

Benzanilid.—Inigi Cantu, of Pavia,⁵⁸⁹_{Aug. 2} considers this drug superior to all other known antipyretics.

Benzoate of Sodium.—In a discussion upon this subject before the Société de Thérapentique, Paris, Vigier⁸⁻⁷_{Mar. 30} insisted upon the

fact that the benzoate of sodium, prepared by his method, does not contain free benzoic acid; and that, when treated by warm water, alcohol, and ether, it is converted into a new basic benzoate of sodium. Patein expressed the opinion that the benzoate of sodium may perhaps be broken up in the small intestine, and that the liberated benzoic acid, after acting locally as an antiseptic, was eliminated by the urine in the form of hippuric acid. Paul replied that, in his opinion, benzoic acid was not a sufficiently powerful antiseptic to hinder the development of the typhoid bacilli. Vigier believed that the salicylates were changed in the stomach, and, since salicylic acid exercises a deleterious influence on the mucous membrane of the stomach, it would be advantageous to substitute the benzoates for the salicylates. Liégeois²²_{Aug. 24} states that in common sore throat this medicament favorably modifies the pain, dysphagia, and inflammation of the pharynx, and often cures the affection in two or three days. In such cases it may be given in doses of 1 drachm (3.89 grammes) to children, and 3 drachms (11.66 grammes) to adults, in the course of the day. It is a good expectorant in laryngitis, when administered at the beginning of the disease. The author prescribes it in this affection as follows: benzoate of sodium, 1 drachm (3.89 grammes); tincture of aconite, 20 minims (1.25 grammes); cherry-laurel water, 1 fluidrachm (3.70 grammes); syrup of codeine and syrup of tolu. of each, 2 ounces (60 grammes); water, 2 ounces (60 grammes). The whole mixture is to be taken in twenty-four hours. In Bright's disease, the author believes the remedy to be of service if persisted in. For this disorder he combines it as follows: benzoate of sodium and tannin, of each, $1\frac{1}{2}$ drachms (5.835 grammes); extract of gentian, sufficient quantity for 100 pills. Six of these are administered during the day. In uric-acid gravel the remedy changes the insoluble urates into soluble hippurates, and thus eliminates the acid from the urine. Liégeois has employed the drug also as a cholagogue, with excellent results. He associates it with rhubarb and the salicylate of sodium, as in the following combination: benzoate of sodium, salicylate of sodium, powder of rhubarb, of each, 1 drachm (3.89 grammes); powder of nux vomica, 10 grains (0.65 gramme). This is to be divided into twenty powders, of which two are to be taken in the course of the day.

Benzo-naphthol.—Gilbert³_{May 11} stated, before the Société Médicale

des Hôpitaux, that this drug can be considered only as an *intestinal* antiseptic; and that it is, therefore, inferior in this respect to betanaphthol, which is a *gastro-intestinal* antiseptic. Benzo-naphthol is but little toxic, 5 grammes ($1\frac{1}{4}$ drachms) per kilogramme of the animal's weight producing, in the guinea-pig, only some weakness, diuresis, and a slight rise of the bodily temperature. In doses of 6 grammes ($1\frac{1}{2}$ drachms) it produces diuresis, slowing of the circulation and the respiration, fall of temperature, coma, and death. The drug may be given clinically in daily doses of from 3 to 5 grammes (46 grains to $1\frac{1}{4}$ drachms), in cachets of 0.5 gramme ($7\frac{3}{4}$ grains) each. Le Gendre³_{May 18} has employed benzo-naphthol with success in simple and dysenteric colitis, and in many conditions of the skin and mucous membranes due to abnormal and excessive intestinal fermentation. He has given the drug to adults in doses of from 3 to 5 grammes (46 grains to $1\frac{1}{4}$ drachms). Ch. Eloy³⁵_{June 1} lauds it as an intestinal antiseptic superior to betol, and believes that it should be preferred in renal cases, owing to its lack of irritant properties. Like betol, benzo-naphthol is of advantage in simple diarrhœa, gastric troubles, colitis, typhlitis, and appendicitis, but it must be given in larger doses than betol. Benzo-naphthol should be administered in small doses, at short intervals, to get its best effects. Five grammes ($1\frac{1}{4}$ drachms) to the adult, and from 0.5 to 2 grammes ($7\frac{3}{4}$ to 31 grains) in the case of children, may be given in the course of the day. Yvon and Berlioz,⁷³_{Nov. 14, '91} from a study of benzo-naphthol, have arrived at the following conclusions: 1. Its toxic properties are feeble. 2. Its antiseptic powers are comparable to those substances classed especially as intestinal antiseptics. 3. The remedy facilitates diuresis and considerably diminishes the possibility of urinary poisoning. 4. It is rapidly eliminated by the kidneys. 5. The dose of the medicament may be put down as 5 grammes ($1\frac{1}{4}$ drachms) per day for adults and 2 grammes (31 grains) for children. It is better to administer it in divided doses; for instance, in cachets of from 0.25 to 0.50 gramme (4 to 8 grains) each, or suspended in sweetened water. Our corresponding editor, Moncorvo, of Rio de Janeiro,⁶⁷³_{Oct} has administered benzo-naphthol to children of all ages, for the purpose of inhibiting intestinal fermentation, especially in diarrhœas of malarial origin. The results were quite favorable; the drug was exceedingly well

tolerated. The benzoic acid resulting from the decomposition of the remedy is eliminated by the kidneys in the form of hippuric acid, and, consequently, acts as a diuretic. The dose given varied from 0.25 to 1.50 grammes (4 to 23 grains), according to the age of the patient and the severity of the case. In adults, Moncorvo has used the drug with success in yellow fever. In several rebellious cases of malarial diarrhœa its combination with an equal quantity of bismuth salicylate gave excellent results.

Benzoyl-Guaiacol—Benzosol.—Bongartz, of Aachen, ²²_{Dec. 9, '91} has succeeded in preparing a compound of benzoic acid and pure guaiacol, to which the name of benzoyl-guaiacol, or benzosol, has been given. It is a substance having a definite chemical composition, is free from the cresol bodies, is inodorous and tasteless, and possesses all the virtues, according to recent clinical studies, of creasote in the medicinal treatment of pulmonary phthisis. Several patients took 1 gramme ($15\frac{1}{2}$ grains) three times a day, that amount of the new combination representing 1.6 grammes (25 grains) of guaiacol. The new drug produced no untoward after-effects; the patients, however, perceived a taste of guaiacol after the administration of the remedy under consideration, but it soon disappeared. On the whole, the results were equal to, if not better than, those obtained with creasote, the patients gaining in weight and expectoration becoming less marked. The drug should not be considered as a specific, but it certainly improves the nutrition and increases the resistance of the patient against the disease. Benzoyl-guaiacol is eliminated by the urine and the saliva, in which secretions it can be detected even when administered in small doses. It is especially recommended by Walzer and Hugues ³_{Jan. 13} in the treatment of tuberculosis. Hugues gives the following mixture: benzosol, 5 grammes ($1\frac{1}{4}$ drachms); essence of peppermint, 2 drops. Mix and divide into 10 lozenges; 1 or 2 to be taken, immediately after meals, three times a day. For a week the patient takes 3 tablets daily; during the next three weeks, 6 are taken daily; during the fifth week, 3 are again taken daily; finally, during the sixth week, none are taken; then the same course is followed again. Walzer ²⁴_{No. 48, '91}; ⁸⁰_{Feb.} combines it with sugar or peppermint-water, as in this way it forms an agreeable medicine for children. He states that the drug decreases the severity of the cough as well as its frequency, and tends at the same time to

diminish the night-sweats and the attendant expectoration. He says that benzosol is decomposed in the system into benzoic acid and guaiacol, and eliminated by the saliva and the urine. He also prescribes the medicament as follows: benzosol, 4 grains (0.26 gramme); chocolate and sugar, of each, a sufficient quantity for one capsule.

Berberis Aquifolia.—Melville E. de Laval, of Lake Linden, Mich.,^{221 Jan.} states that the therapeutic properties of this plant differ essentially from those of the *B. vulgaris* and other varieties. He formulates the following conclusions: 1. *Berberis aquifolia* acts upon the liver in a manner similar to *hydrastis Canadensis*, and especially to the berberine which this latter plant contains. 2. It possesses alterative properties distinct from berberine, which is essentially a tonic; these alterative properties being due to a principle which it contains, but which has not yet been isolated. 3. The employment of *berberis aquifolia*, even when prolonged, has never been followed by untoward effects.

Bhuphali.—See *Corchoris Fasciculatus*.

Bicarbonate of Potassium.—Hunt advises^{157 Aug.; Aug. 18 99} the use of this remedy instead of the chloride of ammonium in the catarrhal condition of the respiratory tract in children. To a child 1 year old he gives $\frac{1}{20}$ grain (0.0032 gramme) every fifteen or thirty minutes till some improvement is shown. Very rarely, it acts as an emetic. In that case the author diminishes the dose, but without changing the interval. In tablet triturates the drug is found to be less irritating than in any other form.

Bi-iodide of Thiophen.—See *Thiophen*.

Bismuth Gallate.—See *Dermatol*.

Bismuth Sub-gallate.—See *Dermatol*.

Bleeding.—See *Venesection*.

Blood-Serum.—See *Animal Extracts*.

Borate of Sodium.—A. Dujardin, of Lille,^{577 Nov., 91} calls attention to the incompatibilities of this drug. He finds, as a general rule, that the borate of sodium behaves like the alkalis, and that, therefore, it should not be associated with the salts of the alkaloids. In mixtures of this kind the patient is apt to take most of the alkaloid in the last dose, with harmful effect.

Boro-Borax.—See *Borax*.

Borax.—G. Lemoine, of Lille,^{67 May 30} reports two interesting cases, in both of which a bluish line upon the gums appeared

after the use of borax. The patients,—one a man 29 years of age, the other 22 years old,—suffering from epilepsy, had received no benefit from the use of bromide of potassium, and were then placed under borax. This medicament was pure. In both instances, as already intimated, the curious bluish line on the gums was observed, accompanied by a slight gingivitis, the gums being swollen and reddened,—due, undoubtedly, to the elimination of the drug by the saliva. According to the author, these are the only two cases, in more than a hundred others subjected to the treatment by borax, in which the phenomenon described occurred. The observations are important from a medico-legal point of view, and the author believes that the line caused by borax is produced through the same mechanism as that caused by lead.

A. Bourgeois⁵⁷⁷_{Aug.} writes about a new product, boro-borax, to which Boymond called attention before the Société de Thérapeutique. Its antiseptic properties are considered superior to those of boric acid. The following solution is advised for daily use: boric acid, 100 grammes ($3\frac{1}{4}$ ounces); borate of sodium, sufficient to neutralize; distilled water, sufficient quantity to make 1 litre (1 quart). Boro-borax is inferior to corrosive sublimate, but has the advantage of not being irritant or poisonous. As an antiseptic, it may be classed with phenic acid, and is superior, as stated, to boric acid. The author believes that in children it should be substituted for corrosive sublimate.

Bromamide.—Augustus Cuille, of New York,¹_{Feb. 20} has made a therapeutic study of this drug, and records several interesting cases in which it produced satisfactory results. He found that it had the power of reducing the body temperature from 1° to 2.5° F. (0.55° to 1.39° C.) in febrile disorders, without giving rise to the excessive sweating which other antipyretics produce. The remedy had no pronounced diuretic action and was free from unpleasant symptoms as regards the alimentary tract. Of the various diseases treated with bromamide, he mentions the following, with the results obtained: Reflex hemicrania from carious tooth, relief in three hours by the ingestion of 15 grains (0.97 gramme); premenstrual headache, 15 grains (0.97 gramme), with marked relief in two hours; compression myelitis, accompanied with intercostal neuralgia, no beneficial effect from 10 to 20 grains (0.65 to 1.3 grammes). The febrile disorders, such

as typhoid fever, pneumonia, articular rheumatism, yielded better results. On the whole, the author considers the remedy worthy of further trial. He says that bromamide can safely be given, as antipyretic and antirheumatic, in the case of adults, in from 10- to 15-grain (0.65 to 0.97 gramme) doses several times a day; to children, in quantities of from 1 to 5 grains (0.065 to 0.32 gramme). The drug is best administered in capsules, wafers, suspended in a fluid, or simply placed upon the tongue.

Bromides.—In order to study the relative toxicity of the bromides, Féré, of Paris, ³_{Nov. 25, '91} made a series of experiments on rabbits, using solutions of the different bromides, these solutions being of the strength of 1 per cent. The injections were made intra-venously, in quantities of 10 cubic centimetres (2½ drachms) every minute. From the results obtained it was found that the toxicity of the bromides may be classed in the following order: bibromide of mercury, bromide of cadmium, bromide of gold, bromide of barium, bromide of copper, bromide of manganese, bromide of zinc, bromide of arsenic, bromide of potassium, bromide of nickel, proto-bromide of iron, bromide of magnesium, bromide of rubidium, bromide of ammonium, bromide of calcium, bromide of strontium, bromide of lithium, and bromide of sodium. All the animals poisoned by the bromides died in convulsions. The bromide of strontium was the least pronounced in its convulsant action. The author, from a practical point of view, calls attention to the feeble toxic qualities of the strontium salt, which are certainly considerably less than those of the potassium bromide. The strontium salt, therefore, he believes to be a valuable substitute for bromide of potassium in the treatment of convulsive affections. Jos. Adolphus, of Atlanta, Georgia, ¹⁹⁹_{Dec., '91} writes very favorably on the bromide of ammonium as a therapeutic agent in the diseases of women and children. He affirms that it acts well in cases exhibiting contracted pupils, pain in the back of head or temples, feeling of stiffness of the neck, more or less flushing of the face, and with the tongue generally clean, but inclined to be tremulous. In cases of convulsions, when the face is not pale, he believes the bromide of ammonium to be particularly indicated. He has employed it with success to combat the severe nervous symptoms of influenza. He thinks that the remedy controls vasomotor excitement, soothes and

quiets the sympathetic system, and allays fluttering of the heart, palpitation, and the pain of angina pectoris. It also stimulates respiration, and is, therefore, to be regarded as a cardio-respiratory stimulant. Satisfactory results are said to be always produced by the ammonium bromide in cases of epilepsy and infantile convulsions, in spinal irritation, and in pains in the muscles simulating chronic rheumatism. In these cases the author has given as high doses as 80 grains (5.2 grammes) a day without causing unpleasant symptoms.

A most interesting article on the subject of bromism is published by Lépine.³_{Dec 23, '91} Opinions regarding the dose of the potassium salt have of late changed considerably. Gübler found a dose of 6 grammes (1½ drachms) enormous, and most of the French authorities give 10 grammes (2½ drachms) as a maximum dose. Soulier and Manquat make this amount the limit. Féré does not fear, at present, to administer from 12 to 15 grammes (3 to 3½ drachms). Gowers, an English authority, goes still farther, and gives as much as 31 grammes (1 ounce) at a single dose, an amount which he advises not to overstep, on account of the vomiting which the drug is liable to produce. The English, however, do not administer daily doses, but prescribe, rather, a dose every second, third, or fourth day, in order to give time for the elimination of the medicament. The German school, represented by Nothnagel and Rossbach, and Tappener and Penzoldt, for example, mostly give 15 grammes (3½ drachms) as the maximal dose. Bernatzick and Boehm give 20 grammes (5 drachms). Lépine does not desire to forbid the use of these doses, as they are sanctioned by undoubted authorities. Experience has also shown that they are not dangerous; but the question is, Are they necessary? He does not regard it as wise to begin with enormous doses when, possibly, a smaller one will answer. It is a question whether such large quantities can be given without harming, even though naphthol be simultaneously administered, as recommended by Féré. Lépine has found that antiseptics of the intestinal tract may prevent cutaneous eruptions, yet not influence the nervous depression. He has been struck by the insidious development of the nervous symptoms of bromism; the diagnosis is not always easy, and he is convinced that, if not recognized, they may be followed by death. He rehearses the classic picture of bromism in its chronic

form, but, though not denying the correctness of this, questions whether all the symptoms will present themselves in the given order. Some may be lacking, and the cachexia may appear before the bronchitis of bromism. In short, it is of importance to the practitioner to know that the symptoms follow no regular order in their appearance. He has recently seen a young, tabetic woman, who took the bromide of potassium in doses of 4 grammes (60 grains) daily for the treatment of the convulsive attacks. After a few weeks the patient, who was weak and run down in health, began to grow still weaker and delirious. No eruptions or bronchitis appeared; so that, if one had waited for the development of these symptoms, death would surely have intervened. Lépine recognizes bromism by the mental and bodily weakness, delirium, and difficult speech. If the bromide is discontinued the symptoms soon disappear. He then refers to various cases reported by different authors, in which other symptoms than the classical ones are described. The changes which take place in the nervous system are not well known; indeed, the possibility of the accumulation of bromides in the tissues is still a disputed question.

Bromoform.—Since Stepp called attention, in 1889, to the use of bromoform in the treatment of whooping-cough, but little has been heard of the drug until the recent publications of Cassel.²⁶_{Mar.} This observer has treated forty cases of the disorder mentioned, and, from the results obtained, he asserts that the remedy lessens the intensity of the attacks. He administered, in several cases, from 3 to 4 minims (0.18 to 0.24 gramme) three times daily to children 1 year old, and from 4 to 5 minims (0.24 to 0.30 gramme) to other children, without the slightest ill effects being noticeable.

Bryonia.—A. Storrs,²_{May}, has employed bryonia alba very successfully in the treatment of pleurisy, acute bronchitis, and pleuropneumonia. He believes that in large dose it is a hydragogue cathartic, and that in small dose it exercises a specific action on the pleura and on the lungs; that it is antipyretic, acts on the liver, and is, besides, a useful remedy in rheumatic affections. Unless the patients have already been ill for several days, he gives them the following mixture: tincture of aconite, 6 minims (0.36 gramme); chloroform-water, 2 drachms (8 grammes); water, sufficient quantity to make 3 ounces (90 grammes). Of

this a tablespoonful is ordered every hour. To the second bottle he adds 24 minims (1.5 grammes) of the tincture of bryonia, and administers a tablespoonful every two hours.

Burdock-Seeds.—See *Lappa Officinalis*.

Calcium.—An excellent contribution to the study of the action of the calcium salts has been presented to the Académie de Médecine by Germain Sée.⁴¹⁵_{Mar.12} The following conclusions are embodied in the research: 1. The bromide, and especially the chloride, of calcium should be employed when it is desired to introduce lime into the system. The usual preparations of lime are uncertain, because absorbed in minimum degree and eliminated in very small quantities in the urine, which shows that they have scarcely passed through the blood. 2. The iodide and bromide of calcium are peculiarly fitted to produce the systemic effects of iodine and bromine. They contain a larger proportion of iodine and bromine than all the other combinations of these metalloids, and the calcium lacks the undesirable properties of potassium and sodium. 3. The bromide and chloride of calcium act favorably in a large number of dyspepsias. 4. If calcium iodide is substituted for potassium iodide the effect of calcium on the stomach is favorable. The action of these salts is identical on the respiration and heart, and in specific diseases; but the dose of the iodide of calcium is smaller, and it is well supported by the digestive organs.

Calumba.—Hugo Schulz, of Germany,¹¹⁶_{Feb.} publishes the results of fourteen cases, in which the tincture of calumba produced decided effects in checking diarrhœa and regulating the action of the bowels. The author found that even in the diarrhœa of phthisis the remedy was successful. The doses employed by him varied from 40 minims to 3 drachms (2.5 to 11.25 grammes), once or twice a day. He also publishes the results of experiments with the drug in five healthy individuals. He found that, when used for a prolonged time, it had a tendency to disturb the bowels; results which apparently confirm those obtained by Percival, of Manchester, over a hundred years ago.

Camphor.—L. Tuassia, of Italy,⁵⁰⁵_{Mar.8}; ²_{Mar.26} has used camphorated oil with good results in many cases of influenza, as well as in pneumonia, typhoid fever, and other disorders. He recommends the administration of the remedy before the patient is too weak,

since, later, a more active stimulant and expectorant is required. Its use appears to be contra-indicated in great cerebral excitement. In cases of typhoid fever, pneumonia, and broncho-pneumonia, the medicament produced an increase of arterial pressure, freer expectoration, and a feeling of physical well-being. The drug was given by the author in from 1- to 5-per-cent. solutions made with oil of sweet almonds, employing essence of peppermint to disguise the taste. The doses varied from 2 to 4 grammes (30 to 60 minims) of the oil daily. The remedy was well borne, and no disagreeable after-effects were noticed. According to Alexander, of Berlin,²⁰²_{Mar.25} camphorated oil is an agent of great therapeutic value, producing the most remarkable effects in follicular angina, coryza, and acute pharyngo-laryngitis. In bronchitis the remedy acts as a good expectorant. In fibrinous pneumonia it diminishes the temperature and notably ameliorates the general condition. Injections of camphor have also proved of service in the treatment of chloro-anæmia. Alexander especially recommends the drug in the treatment of phthisis, particularly during the period of softening, with ulceration, night-sweats, and hectic fever. He affirms that the hectic fever and the sweats often disappear after the first, and always after the third, injection. The cough is diminished, and the patients gradually gain in strength. In tuberculosis of the larynx the pains in the throat are diminished. The injections of camphor likewise exercise a favorable action in hæmoptysis. On the whole, the author believes that this treatment is the best for phthisis, especially during its final period; for, while prolonging the term of life, it also relieves the patient. The drug has a cumulative action, and should, therefore, be employed with caution. The camphorated oil used is that of the German Pharmacopœia, and consists of 1 part of camphor and 9 parts of olive-oil. Of this mixture, 1 gramme (15 minims) is injected at a time.

Seth S. Bishop, of Chicago,⁷²_{Mar.} contributes an article on the uses of camphor-menthol in catarrhal diseases. He has tried the combination with good results in nervous catarrh, hay fever, acute laryngitis, and other similar affections. In hypertrophic nasal catarrh, with excessive and disordered secretion, a 25-per-cent. solution of the drug has given excellent results. The remedy has been found similarly effective in chronic hypertrophic rhinitis, as well as in eczematous and herpetic eruptions. In the first of these it was

employed in the form of inhalations by means of an atomizer, but in the others the camphor-menthol in full strength was used locally, and was found to relieve the pruritus and reduce the swelling and redness. He affirms that the camphor-menthol contracts the capillary blood-vessels of the mucous membrane, reduces swelling, relieves pain and fullness of the head, or stenosis, arrests sneezing, checks excessive discharges, and corrects perverted secretions.

Camphor-Menthol.—See Camphor.

Canadin.—This new body has been extracted from the root of *Hydrastis Canadensis* by E. Schmidt.^{560 673}
No. 8; July It occurs in the form of small, brilliant, white nodules, melting at 134° C. (273.2° F.). A solution of canadin in alcohol, treated by iodine, gives rise to the formation of iodo-hydrate of berberine, a yellow body. The author, therefore, considers canadin a dihydro-methyl-berberine.

Cangoura.—This is the name of a new, poisonous, evergreen, tropical creeper growing in the humid forests of San Salvador. The natives use it to destroy noxious animals, by making a paste of the crushed seeds. Herbivorous animals are said to possess immunity against the plant.^{13 673}
V. 233, No. 2; Aug.

Cannabis Indica.—The symptoms produced by an overdose of this substance are described by W. D. Hamaker, of Meadville, Pa.,⁸⁰
Dec. occurring in a physician, who, to test the quality of the drug, took 41 drops of the fluid extract prepared by Squibb. After the usual symptoms produced by the drug had passed, there remained, according to the writer, redness of the eyes and profuse lachrymation. The patient recovered without any treatment.

Cantharides.—In replying to criticisms made by some authors regarding the use of the cantharidines, Liebreich¹¹⁶
June says that the chief points to be decided are: (1) whether these agents have any action on the diseased, particularly tuberculous, tissue, and, if so (2), whether this effect is obtained before any disturbance is produced in other organs, such as the kidneys. The author says that the drug gives rise to an increased exudation from the capillaries, and hence its beneficial action; but there is no hyperæmia. In his cases of lupus a steady decrease in the disease has been noted; but much time may be needed to effect a cure, as it is impossible for changes lasting for years to be cured by a few

injections. If the kidneys be healthy, these salts may be used in doses of from $\frac{1}{4}$ to 2 decimilligrammes ($\frac{1}{3560}$ to $\frac{1}{320}$ grain) without injury. If the kidneys are diseased, the treatment should not be adopted. Advanced tuberculosis should be treated with the greatest caution, for, the author says, the kidneys are often affected with lardaceous disease. Improvement has been recorded in other than tuberculous processes, *e.g.*, in chronic laryngitis. Any local application of the cantharidines is not rational, as they thus only produce irritation. Liebreich claims that, in hundreds of injections made by him, there has been no more danger to the patient than from the use of mercury or arsenic. Pedro Albarran, of Cuba, ^{Dec. 12}₆ reported a case of cystitis caused by the application of cantharides for blistering. The symptoms presented themselves with considerable severity. Camphor monobromide was given by the mouth, and enemata containing camphor were also applied. No relief was obtained. The condition yielded promptly, however, to the influence of cocaine.

Cantharidines.—See Cantharides.

Carbolic Acid.—In an experimental study of the alterations induced by carbolic acid, W. J. Wilkinson, of Philadelphia, ⁸⁰_{Apr. 15} has obtained important results. In published experiments and investigations of cases the blood is always stated to be normal. This he thinks is an error. The urine is always reported as giving off the odor of carbolic acid in poisoning by this drug, and this also he believes to be incorrect. From the results obtained in his experimental work the author lays a good deal of stress on the character of the blood. He argues that, in the first place, the condition of the blood induced in the animals is one of oligocythæmia rather than oligochromæmia, as the reduction of the blood-corpuscles is not accompanied by any alteration whatever in the percentage of hæmoglobin. For the explanation of this phenomenon he proposes the two following hypotheses: (1) the destruction of the red blood-corpuscles is accompanied by transference of their hæmoglobin to unaltered corpuscles, thus not reducing the quantity of hæmoglobin; or (2) the poison may not interfere with the production of hæmoglobin, while the corpuscle-making process is in a state of suppression. That the latter theory is not unlikely is, he thinks, supported by the fact that the blood coloring matter, or a similar compound, is being excreted all the

time in the urine; which, if true, must mean that coloring matter is being manufactured in order to make up the quantity lost. The animals experimented on were evidently already suffering from oligochromæmia, for the control and pre-experimental study developed a small percentage of hæmoglobin; in fact, a reduction of not less than 33 per cent. of the normal human unit. These animals differ but little from man in the amount of hæmoglobin.

Manuel Casa y Abril, of Zaragoza, Spain, ⁶¹⁹_{Nov. 16, '91} publishes an interesting account of the excellent results obtained in the employment of carbolic acid internally in the treatment of small-pox in the Hospital Militar de Zaragoza. He has formulated the following conclusions: (1) the drug diminishes the temperature, which ascends again when the treatment is suspended; (2) it diminishes the number of cardiac pulsations, at the same time increasing their force; (3) it lessens the extension and duration of the eruption, checks the production of pus, and shortens the period of suppuration, especially when it is administered at the beginning of the disease; (4) in many cases the pustules of the confluent form become shriveled up and dry in a few days under the influence of the remedy; (5) in advanced cases it does not greatly modify the eruption, but will, nevertheless, influence favorably the fever and the general state of the patient; (6) the liability of complications is diminished; pneumonia, enteritis, parotitis, and abscesses are rarely met with, and the pains over the epigastric region are less intense. The patients bear the remedy well, and themselves notice that when they fail to take it their fever and general condition is made worse. The author states that under the influence of the treatment the confluent form of the disease would, in many cases, be changed into the discrete form; and that the discrete variety would assume a benign course and be converted into a kind of varicella. The parotitis consequent upon the disease was favorably modified by the use of gargles of the dilute acid or by the subcutaneous injections of a solution of carbolic acid of the strength of from 1 to 2 per cent. The results obtained seemed to indicate, in fact, that in the treatment of small-pox carbolic acid has as much value as quinine has for intermittent fever. The number of cases observed was 44,—18 of the discrete and 26 of the confluent form. Of this number, 2 patients died from hæmorrhagic confluent small-pox and 1 from the black form; the

rest were all cured. The mortality was therefore 0.5 per cent.; certainly a very encouraging figure. The acid was given in doses of from 1 to 2 grammes ($15\frac{1}{2}$ to 31 grains) in the course of the twenty-four hours, in solutions of the strength of $\frac{1}{2}$ per cent.

Carica Papaya.—Frank Woodbury, of Philadelphia,¹_{July 30} writes at length of the therapeutic properties of this plant, with special reference to papain—or papoid, as it is commonly termed. From a series of clinical observations he has found carica serviceable in gastralgia, irritable stomach, nausea, vomiting, gastric catarrh, catarrhal condition of the intestinal tract, constipation, colic and persistent vomiting in children, infantile irritative diarrhœa, and other similar affections. In apepsia of young children, or in that form of deficiency of the gastric juice in adults due to atrophy of the gastric follicles as the result of chronic catarrhal processes, the glycerin solution of papoid, the author affirms, is especially effective. He summarizes the uses of papoid, in the treatment of disorders of the alimentary tract, as follows: Papoid is of value: 1. In actual or relative deficiency of the gastric juice or its constituents, as in anæmia, apepsia, and wasting diseases, with diminished secretion of the gastric juice as a whole; in atonic dyspepsia and atrophy of the gastric tubules, with diminished proportion of pepsin; in carcinoma, with a diminution of the hydrochloric acid; in overfeeding, with a relative deficiency of gastric juice. 2. In gastric catarrh, with impaired digestion, where there is tenacious mucus to be removed, thus enabling the food to come in contact with the mucous membrane. 3. In excessive secretion of acid, to prevent duodenal dyspepsia. 4. In gastralgia, irritable stomach, nausea, or vomiting. 5. In intestinal disorders, as in constipation due to indigestion; in diarrhœa, as a sedative; in intestinal worms, according to certain observers. 6. In infectious disorders of the intestinal tract, where, from abnormal fermentation, there are foreign substances present. 7. In infantile indigestion, since here the papoid not only readily peptonizes cows' milk, but the resulting curds are soft and flocculent, resembling those of breast-milk. The dose of the papoid is set down as from 1 to 2 grains (0.065 to 0.13 gramme), although as high as 5 grains (0.32 gramme) may be administered.

Cascara Sagrada.—T. G. Stephens, of Sidney, Iowa,⁷⁶⁰_{July 16} reports the case of a woman, 55 years of age, afflicted with

sciatica, in whom cascara sagrada produced relief and a final cure within a short time. The only auxiliary used in connection with the cascara treatment was massage with the balls of the fingers two or three times a day. The fluid extract of the drug was given in ascending doses, beginning with 5 drops a day and increasing this amount by 1 drop every day until free purgation was established. After a period of twenty-four hours, during which the remedy was suspended, treatment was resumed, and a cure resulted.

Castor-Oil.—Toellner and Bergmann ²⁶Mar. have succeeded, after a long series of experiments, in devising a method by which castor-oil can be deprived of its naturally disagreeable taste. The finest oil is obtained, and repeatedly treated with hot water; it is then sweetened with sufficient saccharin to give it the flavor of syrup, and the last traces of its original acid taste are covered by a little vanilla or small quantities of cinnamic aldehyde. The therapeutic action of this preparation is said to be as effective as that of the ordinary castor-oil.

Catramin.—This new terebinthinate has been investigated by Vincenzo Gauthier, of Italy. ⁵⁰⁵Feb. 4; ²Mar. 26 The author states that the substance is chemically an essential oil, resembling very closely the turpentine derived directly from the coniferae. In its physiological action it also resembles turpentine. Catramin is readily absorbed by the stomach, or, when given in the form of vapor, by the lungs. It is eliminated by the urine in the form of a resin. From a series of clinical experiments, catramin was found to be a valuable medicinal agent. The author believes it to be indicated in chronic respiratory troubles accompanied with abundant secretion, in the subacute stages of which it may be advantageously combined with a narcotic. It diminishes the secretion, which, under its use, regains a healthy character. The drug may also be employed in place of turpentine in genito-urinary diseases.

Chloralamid.—The only extensive report made during the year, on the therapeutic action of this drug, is that of James Wood, of Brooklyn, ¹⁵⁷Apr. who finds that sleep is produced in from thirty to ninety minutes, and lasts from five to nine hours. He states that no unpleasant sensations, nor symptoms of cerebral congestion, were occasioned, and that no untoward effects were noticed, even after the continuous use of the drug for ten days. The author

gives the following conclusions, based upon 280 cases: chloralamid is a most useful hypnotic,—reliable, safe, and pleasant; it has a place as an anidrotic in phthisis; it is superior to other hypnotic drugs, because in the ordinary doses it stimulates respiration, and but slightly, if at all, influences pulse, temperature, or urinary secretion, and no secondary symptoms exist. For an adult the best hypnotic dose is 30 to 45 grains (2 to 3 grammes), preferably given in an alcoholic solution and just before retiring. No more than 100 grains (6.48 grammes) should be administered in the course of the twenty-four hours. The author advises the following combination: chloralamid, 2 drachms (7.78 grammes); compound tincture of cardamom, 1 ounce (30 grammes); to this is then added $\frac{1}{2}$ ounce (15 grammes) each of syrup of orange and syrup of raspberry. The dose of this mixture is from $\frac{1}{2}$ to 1 tablespoonful, repeated.

A case in which unpleasant effects were produced by the ingestion of 30 grains (1.94 grammes) of chloralamid is reported by G. E. Alford, of Weston-super-mare. ² ⁶⁷³ _{v.1, p.639; Sept.} Five minutes after taking the dose there came on a feeling of stupefaction and a staggering gait, followed in a few minutes by incoherent speech, delusions, faintness, and semi-coma. In half an hour the patient, a woman, fell into a profound sleep, which lasted for eight hours. Soon after the drug was taken violent purging took place, but there was no vomiting. The patient did not feel refreshed on waking and complained of a severe headache.

Chloroform.—Arthur Devoe, of Seattle, Washington, ¹⁷⁶ _{Mar.} has found chloroform a very useful ingredient in prescriptions used for the treatment of influenza. Steep ⁷⁵ _{No.21} has employed chloroform internally in a large number of diseases. He has obtained no appreciable effects in diphtheria, whooping-cough, pulmonary tuberculosis, or acute gastritis. Given in infantile diarrhœa, with small doses of opium, it will arrest the disease. In old persons he employs chloroform combined with tincture of opium and sub-nitrate of bismuth. Werner ²¹ _{Jan.} has used chloroform in enteric fever, on account of its bactericidal properties,—a $\frac{1}{2}$ -per-cent. solution destroying typhoid bacilli. A 1-per-cent. solution was given, in 1-ounce (30 grammes) doses every one or two hours, at first. Jaundice occurred four times, but in only one case was it necessary to omit the drug. Ergot was given once to check

severe hæmorrhage, and quinine once for intermittent temperature. None of the cases died. The thirst was lessened, the diarrhœa gradually diminished, and meteorism disappeared. In no case admitted with clear intellect did the typhoid state supervene. Chloroform, therefore, according to the author, acts (1) on the intestinal processes, and (2) very decidedly on the nervous system. The treatment does little good in the late stages of the disease. From the results obtained later, in 76 cases treated with chloroform, the author highly recommends a further trial of the drug.

The excellent contribution by du Bois-Reymond on chloroform is reviewed in an editorial.^{1019 80} Attention is called to Pictet's medicinal chloroform, satisfactory reports of which are being published quite frequently. It has been shown, in these various reports, that Pictet's chloroform seldom causes vomiting, excitation, or depression. It is asserted that the quality of the narcosis produced by this substance is more advantageous, in so far as the anæsthesia is wont to supervene very quickly, the reflexes still prevailing, and also to persist long after the cessation of the inhalations. Treating of the purification of chloroform for surgical anæsthesia, Lespian, in a recent thesis,⁹⁹⁶ gives the following conclusions: 1. The careful administration and employment of pure chloroform almost always prevents the production of untoward effects. 2. If the bad symptoms are not wholly absent they can at least be made less common and rendered considerably less dangerous. 3. A pure article can be obtained from commercial chloroform by mixing this with sulphuric acid and caustic soda. 4. Pure chloroform is quite unstable, but its instability can, nevertheless, be prevented by the addition of small quantities of ethylic alcohol, ether, or bromide of ethyl.

Chromic Acid.—Most favorable results in the local treatment of cysts by the use of chromic acid have been obtained by W. R. H. Stewart, of London,⁶ who reports 3 cases of ranula and 7 cases of cystic goitre. Of the ranula cases, 2 occurred in men and 1 in a woman. The other 7 were all met with in women. In the first instances a portion of the cyst was cut away and the contents washed out. The acid was then applied in a saturated solution. By the end of a week the cavity was found to be contracted. In the course of two or three weeks from the beginning of the treatment a cure was generally effected. The same results

were observed in the goitre cases. One of these, however, resisted the cure for three months; but this tardiness is attributed by the author to the fact that the hæmorrhage occurring in the cavity of the cyst neutralized the action of the acid. It will be remembered that this treatment was first suggested by Woakes, of London, about three years ago.

Cinnamic Acid.—See Balsam of Peru.

Cocaine.—Howard Wells⁸⁰_{May} reports six cases illustrative of pronounced sexual irritability, in which excellent results were obtained by the use of cocaine in the form of spray-inhalations and urethral injections. The drug, according to the author, has a decided tendency to produce relaxation of the male sexual organs. He has had occasion to examine several patients who had been treated with cocaine for affections of the throat, and always found that the penis was much retracted, this condition being accompanied by a marked reduction in the sensibility of the glans. Von Oefele¹⁰⁸_{Apr. 16} highly recommends the phenate of cocaine in practical medicine, asserting that the analgesic action of the new combination is superior to that of cocaine by itself, while the small quantities of the alkaloid contained in it lessen the chances, even when hypodermatically injected, of producing poisonous effects.

The following case of poisoning by cocaine is reported by Chobault²¹¹_{May 15}: A man, 72 years of age, was tapped for hydrocele, and 300 grammes (10 ounces) of liquid were removed without causing the slightest loss of blood. Thirty cubic centimetres (1 fluidounce) of a 3-per-cent. solution of cocaine were then injected into the vaginal sac, followed by the introduction, also, of a solution of iodine. Eight minutes later attempts were made to remove the liquid from the sac, but without success. Fearing a possible poisoning, the author immediately resorted to inhalations of nitrite of amyl. But in spite of such a measure the patient, in the course of a few minutes more, exhibited general pallor, especially of the face; great præcordial distress; dyspnœa, with frequently-interrupted inspirations; depression of spirits; general lassitude; a small, filiform pulse, with a frequency of 120 per minute, and a tendency to syncope. Stimulant measures were then applied, and the patient put to bed. The symptoms gradually subsided, and in about one and a half hours disappeared, although the weakness and the general depression continued until

toward evening, the patient appearing as if he had been subjected to great fatigue. During the night he complained of colicky pains, which lasted for about two hours and then ceased, but there were no stools. The general weakness, accompanied by a frequent pulse, continued for about four days, and then disappeared. The patient made a final recovery.

Newell,⁹⁹_{Nov. 19, '91} at a meeting of the Suffolk District Medical Society, called attention to a kind of œdema occurring after the use of cocaine. The phenomenon the author attributes to vasomotor paralysis caused by it. Mixer referred to another case, in which the same phenomenon was observed immediately after the use of the drug. J. A. Wessinger, of Ann Arbor, Michigan,¹_{Mar. 26} reports an instance of poisoning in a young man, the symptoms being: a thready pulse of 150; respirations 5 per minute and simulating the Cheyne-Stokes character; dilated pupils; bilateral sweating; cold surface; consciousness preserved and questions responded to; good vision; no pain; no nausea; surface anæmic. Under these conditions he prescribed 20 drops of the tincture of digitalis, with $\frac{1}{60}$ grain (0.0018 gramme) of atropine hypodermatically, to be repeated in twenty minutes; hot applications to the surface, and alcohol internally. The patient recovered. The author refers to two similar cases, in which this treatment was pursued with the same results. While he believes in the advisability of administering digitalis and other cardiac tonics, he has doubts about any favorable action of atropine in these cases, since atropine and cocaine are synergists. He calls attention to the fact that atropine is a vasomotor stimulant, and, if carried beyond a certain limit, would overcome the cardiac inhibition produced by digitalis, which he believes to be an important factor in the elimination of the cocaine poison. [We believe that the happy results obtained in the case reported by the author were mainly due to the action of the cardiac medicaments employed, digitalis especially. It is doubtful whether atropine does really act as a respiratory stimulant. We refer our readers to the discussion of the question in the article on "Experimental Therapeutics" in last year's ANNUAL.—ED.]

M. K. Bowers²⁰²_{Dec. 26, '91} calls particular attention to the aphrodisiac effects of cocaine, and describes the case of a woman, married and highly respectable, who became a victim of cocaine, and who, while

under its influence, would invariably utter expressions and do things which she would not even have thought of when in her normal condition. These effects appear to be more pronounced in females than in males, and hence the author warns practitioners against the indiscriminate use of cocaine. Three cases of untoward effects produced by the drug are reported by Louis Frank, of Kentucky,²²⁴_{Dec. 5} who also warns against its free use. In one of the cases, which he describes at length, the author states that the chief symptoms came on thirty minutes after the injection of $\frac{1}{4}$ grain (0.016 gramme), and lasted about twenty minutes. They consisted of nausea; weak and slow pulse; shallow and slow respiration; profuse perspiration; subnormal temperature; reddening of the conjunctival mucous membrane. In one of the other two cases loss of consciousness occurred.

Berger²²_{Jan. 27} related to the Société de Chirurgie a case of poisoning by cocaine, communicated to him by an army surgeon. Three to five drops of a 20-per-cent. solution were injected previous to the extraction of a tooth. The root was removed without pain, but the patient, while leaving the room, experienced a sense of suffocation and lost consciousness; clonic convulsions followed; the pulse was hardly perceptible, and the cornea became insensible. He remained in this critical condition for about twenty minutes, and the surgeon thought that it was a hopeless case. Gradually, however, the symptoms disappeared, and in two hours all traces of poisoning had vanished. Berger calls attention to the statistics of Sée, who, out of 260 reported accidents collected, found 21 which terminated fatally. Sée, therefore, is adverse to the employment of cocaine.

Codeine.—See Opium.

Codliver-Oil.—T. Simpson, of Montreal,²⁸²_{Nov., '91} endeavors to show that the medicament is not only efficient as a remedial agent, but that it is in a degree an admirable food. He has used it also as a preventive in many diseases of children with very good results.

Colchicum.—A very interesting case of pytalism produced by colchicum, in a middle-aged woman, is reported by John Shand, of Edinburgh.¹_{Jan.} The drug was given for supposed gouty rheumatism. The dose ordered was 1 minim (0.06 gramme) of the tincture every eight hours. This, the author says, went on regularly and with precision till the twelfth day, when a wonderful

improvement took place in regard to the dropsy of the ankles,—a troublesome symptom in the case,—and the patient at the same time exhibited profuse salivation. This symptom would decrease by diminishing the dose of the drug; and, *vice versâ*, an increase in the amount of the medicament was always attended by a corresponding increase in the ptyalism. The case is important from the fact that the symptom described by the author is quite rare in colchicum poisoning, at least in the human subject; although a case is on record, in the United States Dispensary of 1887, of violent salivation, supposed to have resulted from its use.

Compressed Air.—See Air.

Condurango.—The effects of this drug on the constituents of the gastric juice have been experimentally studied by Wagner, ³⁶⁰ ² Feb. 27; Feb. 27 who concludes, from his researches, that condurango slightly helps digestion, but is quite unable to produce any lasting change in the gastric secretion, and that its influence upon the subjective symptoms is small.

Conium.—In the treatment of convulsive tic, Graeme M. Hammond ⁵⁹ ¹⁵ Feb. 27; Apr. has found conium and atropine good remedies, especially the former. To derive the best advantages from conium, its fluid extract or its alkaloid, coniine, should be used in increasing doses. Beginning with a dose of 5 drops of the fluid extract, Hammond increases the dose 1 or 2 drops daily until the tic ceases, or until the physiological action of the drug is produced. When, however, the patient complains of weakness, vertigo, and double vision, the dose should be reduced to the original quantity, and increased as in the first instance.

Copaiba.—In a series of experiments upon the diuretic action of copaiba balsam in children, Alexander A. Kisel, ⁵³⁰ ²⁶ No. 4; May 2 of Moscow, found that the drug augmented the daily amount of urine in three out of seven cases; in two it was diminished; and in two it did not undergo any change. The little patients experimented upon were kept constantly in bed. The balsam was given in the form of an emulsion. Each observation lasted fifteen consecutive days. Some experiments made with the *resin* of copaiba gave negative results. The dose given of this latter substance was from 0.6 to 1.8 grammes ($9\frac{1}{4}$ to $27\frac{3}{4}$ grains). Georgiewsky ¹⁴ ^{No. 44} has collected a series of observations from the clinic of Lioch, of St. Petersburg, on the action of the balsam of copaiba, and especially

of its resin, as a diuretic in cirrhosis of hepatic origin. He has also made a series of observations in animals, and from all these studies he concludes: 1. The diuretic action of the balsam of copaiba and of its resin in hepatic cirrhosis is incontestable, and is energetic as compared with that of other drugs of this class. 2. It is preferable to give the resin of copaiba, for the administration of the balsam is accompanied by such disagreeable symptoms as gagging, retching, and vomiting. 3. Its prolonged administration, even if continued for several weeks, has no injurious effect on the digestive organs.

Copper.—Notwithstanding the opposition with which this remedy has met, as shown in the ANNUAL of last year, the drug continues to claim the favor of some practitioners. Thus, Lucien Arnaud⁶⁷_{May 15} has made a valuable contribution to the study of the therapeutic action of the sulphate of copper in the treatment of endometritis. The cases reported by him are 10 in number, of which 1 was catarrhal, 1 post-puerperal, 1 puerperal, and 7 blennorrhagic in character. The ages of the patients varied from 16 to 23 years. In all of them the remedy was applied locally, in the form of pencils, and the results, as a whole, were highly satisfactory. The author affirms that the drug acts superficially, and does not produce the deep scars caused by chloride of zinc; that its effects are less powerful, but more certain than those of the latter medicament, and that it does not produce atresia of the uterine canal. All the cases treated, especially those of the blennorrhagic character, failed to be benefited by other therapeutic measures, but were cured under the copper treatment in a comparatively short period of time,—that is, in from four to twenty-five days. One application was always sufficient to produce the desired effect. The writer further recommends, before the use of the copper treatment is commenced, the adoption of the following rules: 1. Antisepsis of the genital organs for two or three days. 2. Rest in bed. 3. The administration, one day previous to the copper application, of bromide of potassium; this to be repeated on the following day, and, if necessary, a uterine injection of chloral given.

F. M. Morgan, of Berkley, Virginia,⁷¹_{Aug.} relates one case of dysentery in an adult and one of cholera infantum, in which excellent results were obtained under the influence of the arsenite of cop-

per. In the first case the author gave as a dose $\frac{1}{1000}$ grain (0.000065 gramme) every ten minutes for four hours; in the second case, a child 6 months old, he gave $\frac{1}{300}$ grain (0.00022 gramme) every half hour. Complete and prompt recoveries were observed in both cases. Ben. H. Brodnax, of Brodnax, La.,¹⁷⁶_{Feb.} considers the arsenite of copper indispensable in the treatment of fermentative troubles of the alimentary tract. He thinks it particularly effective when combined with Dover's powder, provided the stomach is not irritable. N. P. Pearson, of Chicago,¹³⁹_{Feb.} has used copper successfully in the treatment of tapeworm, and says that it will act when other remedies fail. The following combination is recommended: oxide of copper (black), 2.0 grammes (30 grains); extract of gentian, sufficient to make 30 pills. One of these pills is ordered four times a day, and acid food and drink is prohibited during the week. The observer affirms that the worm is expelled completely.

Corchoris Fasciculatus.—R. P. Banerjee, of Pachbadra, Rajputana,²³⁹_{May} has made a trial of this plant, which in India is commonly called *bhuphali*. It is used by the natives in bronchial, alimentary, and urinary diseases as a valuable remedy in expediting the elimination of mucous secretions or discharges. All parts of the plant are used except the leaves and the flowers. When given in the form of an infusion, it produces a marked diuretic effect. The author has tried the drug in sixteen cases of bronchitis with good results. He found that it diminished the cough and relieved the uneasiness of the chest, and he claims that, without the aid of any other agents, it cured, on the average, in twenty days. He also used it with advantage in three cases of bronchial catarrh and in five of gonorrhœa. In bronchitis, the powder was employed in doses of from 5 to 20 grains (0.32 to 1.3 grammes) three or four times a day. In bronchial catarrh, the drug was combined with cinnamon or with ipecacuanha. For gonorrhœa the following powder was used: powder of corchoris, 2 drachms (7.78 grammes); powder of black pepper, 20 grains (1.3 grammes); powdered sugar, 30 grains (1.94 grammes). One of these powders was administered three times a day. A cure in these cases was effected in about a fortnight. The drug produced no untoward gastric or nervous effects, as is so often seen in the administration of copaiba and sandal-wood oils.

Coronilla Varia.—V. Poulet⁴⁷¹_{Oct. 15, '91} reports nine cases of cardiac disease, of organic or nervous origin, in which the most satisfactory results were obtained from the employment of this plant. In some of them digitalis had failed, but coronilla acted most favorably. The author believes, on the whole, that the plant may not be considered a substitute for digitalis, but may be employed with the happiest results in those cases in which digitalis is indicated. Coronilla has no cumulative action, and can be given for a long time without danger. It causes no gastro-intestinal disturbance, even when administered in large doses. The drug increases the appetite. In cases of tachycardia, in which digitalis appears to be powerless, coronilla controls the irregular acceleration of the cardiac beats and removes all painful phenomena of a reflex nature. The drug is an excellent diuretic, and the author compares its action to that of sparteine. It was found serviceable in the treatment of influenza, especially in those cases in which irregular febrile paroxysms were of frequent occurrence. The plant may be employed in the form of a tincture, the daily dose of which is put down as from 3 to 4 grammes (46 to 62 minims).

Creasote.—C. Burlureaux,³⁶³_{Mar. 5} in studying the uses of creasote to determine the gravity of tuberculosis, has come to the conclusion that creasote has, in tubercular disease, as much value, from a prognostic point of view, as Koch's remedy possesses as a diagnostic agent. Upward of one hundred cases of pulmonary tuberculosis treated with creasote are reported by Penrose.⁵⁹_{Apr. 9} Improvement was observed in all of them, although no cures were effected, owing, according to the author, to the advanced stages of the disease. Many of the patients, however, who certainly would have died but for the use of the drug, have been able to go to work. He recommends that it be pure and administered in ascending doses. From an elaborate study of creasote, E. Main⁶⁷_{Mar. 15} has apparently established the fact that it and its elements are poisonous in the following order: (1) paracresylol (least); (2) phlorol; (3) guaiacol; (4) creasote; (5) creasol. Locally applied, creasol was the most irritant and guaiacol the least. The most important characteristics of these elements are: that they are feebly poisonous, that a tolerance can be established for them, and that they are eliminated by the lungs. As remedies for tubercular phthisis they can be arranged in the following order: phlorol, creasol, paracresylol,

guaiacol, and creasote, which is the most powerful. It is believed that, although the elements of creasote have some value (and, indeed, guaiacol should be especially mentioned), yet creasote itself is the most active. Beech-wood creasote should be preferred, on account of its antiseptic power, and because of the results furnished by experimental therapeutics, as well as by clinical observations. Howard S. Straight, of Ohio,²²²_{Dec.} believes it to be the most valuable of remedies in slight apical catarrh. The drug is best given in a solution of alcohol and glycerin, or in capsules. According to the author's experience, the medicament does little good in confirmed phthisis. A case of poisoning by it is reported by W. Freudenthal.⁵⁹_{Apr. 23} The patient was a woman, 31 years of age, suffering from phthisis, and whom the author had been treating with creasote. Commencing with a small dose, this was gradually increased until she was taking 2.4 grammes (37 grains) daily. One morning, after her walk, having already had her morning dose, but feeling weak, she took a second dose of the usual amount. She had hardly strength enough to drag herself to bed, where she lay unconscious for some eight or nine hours. When seen, late in the evening, she was in a state of narcosis; her eyes were closed; her breathing stertorous; there were loud, coarse râles over the whole chest, and audible from a distance; her teeth were so tightly clenched that it was impossible to separate the jaws; her lips cyanotic; and her pupils were contracted, and did not react to light. There was paralysis of all reflex movements; the pulse was 128; respirations, 30; and she passed water in the bed. Ammonia was held to her nostrils, a mustard foot-bath was given, and ice applied to the head, and when she awoke she felt no ill effects. Subsequently in the course of treatment she took even larger doses, but without experiencing any of the former troubles. It is worthy of note that there were no renal manifestations.

Creolin.—Fliesburg¹⁰⁵_{Dec. 15} reports the following case of creolin poisoning in an infant of three weeks. About 7 o'clock in the evening the baby, by mistake, had been given 30 drops of undiluted creolin. It vomited immediately, and showed symptoms of great irritation about the mouth and fauces. A physician who had been called in ordered only a pepsin mixture and some bismuth powders, but no demulcent drinks. When Fliesburg arrived, in the night, he found the babe vomiting and crying, show-

ing intense irritation of the mouth, fauces, and larynx. He gave plenty of whites of eggs and milk, with instant relief of the vomiting, and the child then slept for two hours. Before leaving, the author ordered an oleaginous mixture, to be given hourly. The next day the little patient was about in the same condition. Toward evening developed cyanosis, cold sweat; weak, rapid pulse, and severe spasms of the glottis. The baby gradually grew worse during the night; and toward morning, twenty-seven hours after the ingestion of the poison, died from heart-failure and the affection of the glottis. The author says that it appears, from this case, that creolin partakes of the nature of the other coal-tar products, influencing the blood and the respiratory centres. He believes that the child might probably have been saved if milk and albumen had been prescribed from the very beginning.

Dermatol—Gallate of Bismuth.—According to Glaeser,^{317 6}_{91; Mar.5} who appears to have employed the drug extensively, dermatol cannot replace iodoform, but it is of special value in the immediate treatment of rupture of the perineum occurring during labor, and also in the plugging of the uterus. It may also be employed with advantage in laparotomy, in operations for prolapsus uteri, and in fistula. These results are sustained in a second communication.³⁶⁹_{No.1} According to the experiments of A. Bluhm,¹¹⁶_{Dec.,'91} dermatol is destined to be of some value as a dry antiseptic. The author has found it active against the following micro-organisms: staphylococcus pyogenes albus, staphylococcus pyogenes aureus, streptococcus, bacillus pyocyaneus, vibrio cholerae Asiaticae, vibrio Finkleri, bacillus typhi abdominalis, bacillus acidi lactici, micrococcus tetragenus, bacillus subtilis, bacillus anthracis, and bacillus prodigiosus. In all cases dermatol prevented the growth of the micro-organisms, and in some it destroyed them. Clinically the drug was tried in eight cases of ulcer cruris, producing satisfactory results in all of them and lessening the secretions. In one case it advantageously replaced iodoform, which was not well borne. It gave the same excellent results in many cases of minor surgery. One case of carbuncle was rapidly healed. Mixtures of dermatol and glycerin were employed locally with good results in the treatment of uterine catarrh. Apparently no good results followed its internal administration. He states that a dentist who had tried the drug reported favorably on its effects. Robert Asch, of Bres-

lau, ²⁶_{Apr.1} does not believe that it can be readily substituted for iodoform, but that it is valuable when used in conjunction therewith. Its chief virtue, he believes, lies in its drying powers. In cases of eczema caused by, or arising during, the use of certain antiseptic dressings, dermatol is quite efficacious. Dermatol gauze, employed as tampons, is lauded by the author in vaginal irritation. He relates a case of considerable irritation of the os uteri and fornix of the vagina in which tampons of dermatol proved of great efficacy.

Eugene Doernberger ¹¹⁶_{Feb.} has employed dermatol extensively, in forty-three cases, in children. He has found it very useful in the moist and impetiginous forms of eczema. It was not, however, effectual in preventing the development of papular eczema. Abscesses, first incised and then treated with the powder, healed rapidly. In the case of wounds, he found that it must be used in large quantities. He recommends it, in the form of ointment, in the treatment of burns. In cases of otorrhœa, Doernberger thought that the results were not conclusive, while in phlyctenular conjunctivitis it proved useless. He believes that further experiments are necessary to determine whether it will displace iodoform as an antiseptic. Its non-toxic qualities are of great importance in the case of children. The drug was used, in the form of ointment of 10-per-cent. strength, with vaselin, or as a 10-per-cent. gauze. Azúa, of Madrid, ⁶³²_{Mar.7} states that even in large quantities it does not produce any untoward effects. The medicament dries bleeding surfaces in a wonderful manner, stimulates granulations, and is particularly efficacious in skin diseases characterized by much discharge. The author was unable to confirm the statements of Rosenthal and others in regard to the antiseptic properties of dermatol, and has failed to notice any favorable modification, such as iodoform produces, in unhealthy septic wounds, in deep wounds out of which pus finds its way with difficulty, in soft chancres, or in suppurating buboes. In such cases, Azúa believes that dermatol only dries the surface of the ulcer. Applied, however, to wounds which have already commenced to granulate it stimulates the process. Similarly, in the case of soft chancre, after the ulcers have been cleansed with antiseptic lotions, dermatol hastens repair and brings about rapid and thorough healing. He believes that dermatol, on account of its drying and astringent properties,

its absolute harmlessness, and the ease with which it can be employed, may be advantageously used in diseases of the skin to replace the powder of starch, the oxide of zinc, and other substances. It is also useful in affections of the female genital organs. Guinard and Cadéac²¹¹_{May 8} have communicated to the Société des Sciences Médicales de Lyon their experience in the use of this drug, especially in veterinary practice. They have found it particularly valuable in auricular catarrh of dogs, with or without ulceration, but characterized by a fetid odor. The medicament gave, also, excellent results in humid eczemas, which, in the dog, are generally of a rebellious nature, and upon which it exercises a desiccant and astringent action. They also made some experiments relative to its action on micro-organisms, but found that it could not be considered as a microbicide. They concluded, finally, that dermatol should not be looked upon as a substitute for iodoform.

Diaphtherin.—Under the common name of *diaphtherin*, a new antiseptic, *orychinaseptol*, has recently been proposed by Emmerich,²⁶_{July} who found the drug to possess bactericidal powers and but slight toxic properties. Kronacher³⁴_{May 10} has found it to be non-poisonous to guinea-pigs when administered in doses of 4 grains (0.26 gramme) hypodermatically, or even as high as 30 grains (1.94 grammes) per rectum. It possesses decided germicidal powers. A solution of the strength of 0.3 per cent. and one of 0.1 per cent. were sufficient to kill the *staphylococcus pyogenes aureus* in the course of fifteen minutes and forty-five minutes, respectively. Diaphtherin occurs in powdered form, very soluble in water. Solutions of 1-per-cent. strength have been employed with advantage in the treatment of wounds. It may also be used as a dusting-powder. The only disadvantage noticed so far is the staining of steel instruments occasioned by the drug.

Digitaleine.—See Digitalis.

Digitaline.—See Digitalis.

Digitalis.—Masius⁵²_{Apr. 30} has made an excellent therapeutic study of this drug, and says that, administered in doses of 4 grammes (62 grains) in the course of the twenty-four hours, it acts as a tonic to the heart, increasing its energy, regulating its beat, and, as a result, combating venous stasis, œdema, dyspnœa, and all the symptoms that are due to cardiac insufficiency. It also diminishes the temperature when febrile, bringing it down to the normal, but

does not reduce normal temperature. The rapidity of the action of the drug on the heart depends on whether there is or is not a febrile state. In the infectious febrile diseases, digitalis not only relieves cardiac weakness, but also acts on the temperature and the infectious products. When cardiac weakness is the only condition to be influenced, the action of digitalis is comparatively more rapid. There are, of course, individual differences. In doses as above stated, digitalis acts always as a sure cardiac medicament. Its tonic action is almost always obtained after thirty-six hours, and exceptionally after twenty-four hours. Doses of 4 grammes (62 grains) a day may be advantageously continued for three or four days. The duration of the medication varies according to the character of the case. These doses, thus administered, do not produce untoward effects upon the digestive tract more frequently than do small doses, nor do they favor the appearance of the paralytic period. The cumulative action is not especially enhanced by them. Ordinarily, the effects of the medicament are shown during from three to seven days after its administration has been stopped. Digitalis, in doses of 4 grammes (62 grains) a day, exercises in pneumonia a favorable action upon both the heart and the temperature. In the different cases observed by the author, crisis was manifestly produced from the fifth to the twelfth day. It does not prevent the fatal termination of cases particularly grave. Writing upon the indications and mode of administration of digitalis, Albert Robin, of Paris, ¹⁷_{Jan. 26} says (1) that digitalis, like most medicaments, is not the remedy of one disease, but of certain morbid conditions; (2) that when a medicament is prescribed its action should be enhanced by the association of other medication, as in this way the administration of small amounts of the principal remedy is allowed; (3) that drugs often produce opposite effects, according to the doses in which they are given; (4) that, finally, a therapeutic measure that has for its basis the consideration not of a morbid state, but of morbid elements, and that has for its object the application of the remedial action to these elements, is the most rational and the most productive of good.

C. R. Illingworth, of Accrington, ²_{May 7}, confirms the statements of Seymour Taylor in regard to the dangers of using digitalis in valvular disease of the heart. He has often noticed attacks of syncope from 10-minim (0.60 gramme) doses in aortic valvular dis-

ease, and with 5-minim (0.30 gramme) doses in mitral disease. He found the remedy useful in certain cases, and in these the benefit was caused not by a directly tonic, but by a depressant, action of the drug. The author also believes that in weak heart, or during the healing process of a valvular lesion, no more dangerous drug could be given than digitalis. From a careful study of the comparative value of the commercial digitalines and their employment in practical medicine, J. Fouquet, of Paris, ⁶⁷_{Jan. 30} has arrived at the following conclusions: 1. There exists in digitalis a well-defined active principle, which possesses all the properties of the plant. 2. Other principles have been extracted from digitalis, and they may be classed in this manner: (a) digitalines *soluble in chloroform*, but not in water, such as *crystallized digitaline*, *amorphous digitaline*, and *digitoxine*; (b) digitalines insoluble in chloroform, but *soluble in water*, such as German *digitaline* and *digitaleine*. The products of the first group possess, in the state of purity, the same activity. They are the ones that should be exclusively employed, especially the crystallized form. 3. This medicament must be administered in large doses,—that is, 0.001 gramme ($\frac{1}{64}$ grain) at a time. If the diuresis is not marked, a dose of 0.0005 gramme ($\frac{1}{360}$ grain) should be given on the following day, but care should be exercised in its continued use, owing to the cumulative action of the drug.

What is supposed to have been a case of poisoning by digitalis is reported by W. W. Scott, of Park Place, Ark. ⁸²_{Apr. 23} A man, who had been suffering from influenza, and had dropsical symptoms, was given digitalis. The œdema was relieved, but a few days afterward, having continued to take the drug, the patient was attacked by the following phenomena: no pulse at the wrist; cold extremities; impaired vision; sighing respiration; heart very feeble, and only beating 30 per minute. There had been, previously, some vomiting of a greenish matter. Strychnine hypodermatically and alcohol caused a recovery.

Digitoxine.—See Digitalis.

Diuretin.—An exhaustive clinical study of diuretin has been made by Masius, ⁵²_{Nov. 28, '91} who believes that the salicylate of sodium and theobromine is a powerful diuretic, not only increasing the amount of urine, but the quantity of the solids in the fluid as well. Its diuretic effects are noticed twenty-four hours after its

ingestion; and the same phenomena are observed under the continued influence of diuretin, if its employment in small doses is persisted in for a period of eight or ten days. Diuresis becomes lessened with the disappearance of the œdema. The circulation is only secondarily influenced by diuretin through the re-absorption of the serous fluids in the tissues. The pulse is stronger and more voluminous. The tonic action exerted upon the heart is an indirect one, and follows the increase in the secretion of the urine. Diuretin, in the experience of the author, gives the best results in general dropsies due to cardiac insufficiency. It often produces these effects when digitalis and other diuretics are inefficacious. Nevertheless, the salicylate of sodium and theobromine does not always diminish the anasarca of cardiac origin. These failures may be attributed either to individual idiosyncrasies or to renal changes. Diuretin is quite efficacious in the treatment of effusions of inflammatory origin; but it does not produce good results either in ascites or in nephritis. It does not exert a marked diuretic effect in renal troubles due to arterio-sclerosis and complicated by heart disease, but it does diminish the quantity of albumen excreted in the twenty-four hours. The drug sometimes causes disagreeable after-effects, such as vomiting and diarrhœa. Demme ^{41 3 99} _{Aug. 8; Feb. 24; Sept. 1} finds the remedy applicable in childhood, from the end of the first year, as a valuable diuretic and one free from injurious action. The drug appears to act on the renal epithelium. The author believes that at times, in the excessive dropsy of scarlatinal nephritis, after the first acute stage of the inflammation is past, diuretin overcomes the condition more quickly than any other treatment. Dropsy from mitral insufficiency can generally be quickly cured by it after compensation has been obtained through digitalis. No cumulative action has been observed nor diminution of the therapeutic effects, even after several weeks' use. The author employs the remedy in daily doses of 0.5 to 1 gramme ($7\frac{3}{4}$ to $15\frac{1}{2}$ grains) for a child 2 to 5 years of age; to a child of from 6 to 10 years old, 1 to $1\frac{1}{2}$ grammes ($15\frac{1}{2}$ to $23\frac{1}{4}$ grains) is given. Diuretin is best administered in water, with the addition of cognac and sugar.

Alexander A. Kisel, of Moscow, ^{530 26} _{No. 4; May 2} has made a series of experiments upon the diuretic action of this substance in children. The little patients were kept constantly in bed. Each

observation lasted during fifteen consecutive days. The dose of diuretin administered varied from 0.5 to 2 grammes ($7\frac{3}{4}$ to 31 grains). In only 2 out of 6 cases did the drug produce an increase in the amount of the urine; in the other 4 no changes in this respect were caused. H. A. Hare, of Philadelphia,⁸⁰ details 4 cases in which the drug was tried. His observations were carefully made, but he failed to find any decided diuretic action, and warns against the tendency of attributing to drugs effects that are not really produced by them. Thus, for instance, he mentions the case of a patient who was passing 20 ounces (600 grammes) of urine before the administration of any medicine; he was then ordered diuretin, but, owing to unavoidable delay, failed to receive it at once. In the next twenty-four hours he passed 60 ounces (1800 grammes) of urine without any drug, an increase which would have been assigned to the treatment, had this been carried out.

Ghillany⁶_{Mar.5} calls attention to the property possessed by diuretin of absorbing carbon dioxide from the air, and so becoming insoluble. He recommends, therefore, that the drug should be kept in solution in distilled water, in well-stoppered bottles.

Duboisine.—The powers of this substance in mental disorders of a certain kind are lauded by Roberts Bartholow, of Philadelphia.⁹_{Dec.12, '91} He has seen cases of puerperal mania yield to it when all other means had failed. He believes that it is more effective when given hypodermatically than in any other way. The minimum dose of duboisine may be put down as $\frac{1}{100}$ grain (0.00065 gramme), while its maximum should not exceed $\frac{1}{60}$ grain (0.001 gramme).

Echinacea Augustifolia.—I. J. M. Goss, of Marietta, Ga.,¹⁹⁹_{Aug.} calls attention to the therapeutic virtues of this plant. He says that it is very valuable in the treatment of old ulcers, both when administered internally and when applied locally in the strength of 1 part of the drug to 2 parts of water or glycerin. He has also tried it in the treatment of bites of rabid dogs, and asserts that he has prevented the development of hydrophobia in all of the cases. Reference is made to three other cases of the same nature, occurring under the observation of I. G. Goss, of Bowman, Ga., in which the same happy results were obtained. The author has likewise employed it with good results, in several cases of syphilis

in various stages. The plant is best used, according to the writer, in the form of a saturated tincture, in doses of from 30 to 60 drops every two, three, or four hours.

Ergotinine.—See Ergot.

Ergotin.—See Ergot.

Ergot.—Van Engelen and Dutrannoit⁸⁶⁸_{No.2} have published conjointly an elaborate research on the chemical history of ergot. As a result of their investigations, they find that the drug owes its action to the presence of (1) ergotinine; (2) sclerotinic acid; or (3) both substances combined. They believe that, to obtain the best results from the action of ergotinine, Bonjean's ergotin or the fluid extract of the German Pharmacopœia should be employed. To obtain the action of sclerotinic acid, Bonjean's ergotin, Bonjean's dialyzed ergotin, or the German fluid extract should be used.

Ericolin.—See *Ledum Palustre*.

Erythrophleine.—An exhaustive physiological and clinical study of this alkaloid has been made by G. Sée, of Paris.³¹_{Dec.3,'91} It is extracted from the bark of *Erythrophlœum Guineense*. Administered to animals, it produces an increase of the arterial pressure, followed by irregularity, and then slowing, of the heart. It paralyzes the neuro-diaphragmatic apparatus, and the author therefore concludes that, in healthy men and in dogs, it diminishes the number of respirations, while it increases their amplitude. He has tried the remedy in 19 cases: 6 with valvular lesions, 1 with phthisis and dry pericarditis, 1 with phthisis, but without cardiac disease; 1 with uræmic dyspnœa and interstitial nephritis, 6 with emphysema or asthma, and 4 with dyspnœa of nervous origin. The dose employed was from 0.0015 to 0.0025 gramme ($\frac{1}{40}$ to $\frac{1}{25}$ grain). Larger doses produced symptoms of poisoning. A dose which is well borne by the digestive tract has little effect on the heart. The author found that the dyspnœa was in most cases diminished, and in all cases erythrophleine produced a feeling of well-being, and the patients breathed more freely. The observer believes that this effect is due to an excitant action of the drug upon the respiratory centres.

Euphorin.—This new medicament, to which attention has already been called in last year's ANNUAL, has been the subject of a special clinical study by C. Curtis, of Rome.⁵⁸⁹_{July 7} The author has made two hundred clinical observations, and has also studied the

drug from a bacteriological point of view. The conclusions embodied in his able paper are as follow: 1. Euphorin is a powerful and safe antipyretic, acting better when the fever is at its maximum and during the period of subsidence than in the early stage. The effect shows itself in from half an hour to two hours, and lasts from three to six, and even ten hours. 2. Defervescence is attended by a feeling of warmth and by moderate sweating, and when the temperature rises again the accompanying rigor is not severe. 3. It does not cause any serious secondary effects, and, though there is sometimes a little cyanosis, there is never collapse. 4. Euphorin can be used in preference to any other antipyretic when a rapid and marked lowering of the temperature is required. 5. It answers fairly well as an antipyretic in surgical fevers. 6. It is a most potent antirheumatic. In acute rheumatism its action is certain; in the chronic forms its effect is also satisfactory, and it usually succeeds in cases which have resisted all other remedies. 7. In patients suffering from fever 1.20 grammes (18 grains) should be given in four or five divided doses. In febrile rheumatic affections from 1 to 2 grammes ($15\frac{1}{2}$ to 31 grains) should be given in the twenty-four hours; in chronic rheumatism 1 gramme ($15\frac{1}{2}$ grains) in three or four doses. On the average, 1 gramme ($15\frac{1}{2}$ grains) of euphorin corresponds to 2 grammes (31 grains) of antipyrin. 8. Euphorin has a definite analgesic action in neuralgia, unless it is of a specific nature. 9. Euphorin is a powerful antiseptic, its action being intermediate between that of carbolic acid and that of corrosive sublimate. 10. It is one of the most effective disinfectants in thrush. 11. In local applications it has advantages as compared with iodoform, iodol, aristol, and other drugs of this kind; it is more powerfully antiseptic and less desiccating than dermatol. 12. Euphorin used locally, in powder or in an ointment with vaselin or lanolin, is also an anodyne and promotes the healing of wounds and ulcers. It gives excellent results in surgery and gynaecology and in syphilis and diseases of the skin.

L. M. Bossi ⁵⁸⁹_{loc. cit., '91} has employed the drug with good results in twenty-nine cases in gynaecological practice. He tried it in vaginitis, parenchymatous cervicitis, parenchymatous cervico-metritis, and other allied conditions. In all cases it acted favorably and produced a rapid reparation of tissue. He believes it to be supe-

rior to iodoform and other similar drugs. Bergerio⁵⁰⁵_{Apr. 7} has tried it as a local application in twenty cases of ulcerative cervicitis, in four of which the condition was complicated by eversion of the mucous lining of the cervix. After five or six applications of an ointment the lesions were advancing toward recovery. He used the remedy in powder by insufflation, and in a 1 in 3 alcoholic solution, and in this way cured some cases of septic endometritis. In order to avoid mistaken conclusions, no other disinfecting agent was used at the same time, all douching of the genital canal being done with sterilized water. From a special clinical investigation, Raimondi and Ciullini, of Siena,⁵⁸⁰_{Jan. 15} claim that euphorin is a powerful antithermic, and that it may be a substitute for acetanilid and antipyrin, especially in cases where these two latter remedies are contra-indicated. Euphorin is not, however, according to these authors, destitute of toxic properties, and may produce serious effects when indiscriminately used. As an anti-rheumatic, the writers believe it to be inferior to the salicylate of sodium.

Europhen.—Siebel⁴_{No. 8; May 21}¹⁹ has employed europhen with good results in the treatment of burns, whether these were produced in the ordinary way or due to the application of such agents as soda, lye, boiling glycerin, sulphuric and hydrochloric acids, and burning alcohol. He applies the drug in the form of powder or gauze, this latter of the strength of 10 per cent. He has similarly employed an ointment made with vaselin and lanolin, in the strength of from 3 to 10 per cent. Severe burns completely healed after three or four dressings. The longest period of healing (twenty-two days) was observed in a case of severe injury from hydrochloric acid, extending from the elbow to the wrist over a breadth of five centimetres. Unfavorable effects or symptoms have never been observed by the author, and in children the drug can be employed with comparative safety. The writer himself took internally, for a period of three weeks, from 5 to 8 grammes (80 minims to 2 drachms) of a 20-per-cent. solution every day,—that is, about $1\frac{1}{2}$ grammes (23 grains) of europhen daily,—without experiencing any discomfort whatever, even as much as an impairment of the appetite. He believes that the results are better than with iodoform; since, besides the absence of all disagreeable odor, there is no danger of the toxic effects, which, although

fortunately rare, are sometimes observed from the application of iodoform.

A. Nolda,^{116 760}_{Oct.; Nov. 28, '91} from a series of careful clinical observations, finds that europhen is indicated in all cases in which iodoform has hitherto been used; that in suppurating ulcers and inflammations its healing effect exceeds that of iodoform; that it has, further, the following advantages over the latter medicament: 1. The non-penetrating and not unpleasant odor. 2. Its low specific gravity,—five volumes of europhen weighing the same as one volume of iodoform. 3. Its innocuousness.

Mario Migneco, assistant to Ferrari,⁵⁰⁵_{Jan. 2} has studied this drug clinically, with results more or less satisfactory. He does not believe that europhen is a substitute for aristol in eczema. He considers it quite efficacious in the following complaints: hæmorrhages caused by opening of erosions; atrophic processes in the nose; perforating cartilaginous ulcers. It is also valuable in operations upon the nose. Migneco has also tried the drug in venereal and syphilitic diseases, such as soft chancres and gummatous ulcers. In soft chancres he found the drug superior to iodoform, diminishing the secretions rapidly and causing an equally rapid reparation of tissue. The results in the treatment of gummatous ulcers were less satisfactory. Europhen proved efficacious against an anal fissure in a syphilitic case. W. H. Gilbert¹³⁸_{July} reports 7 cases treated with europhen, comprising 2 of ulcer of the leg, 2 of recent wounds, with loss of substance, and 1 each of chancroid, scrofuloderma, and burns of the second degree. From the good results obtained, the author believes that it is preferable to iodoform in many particulars. He recommends the alternate applications of europhen in the form of powder and ointment, as in this manner the formation of crusts is prevented.

John V. Shoemaker, of Philadelphia,⁶¹_{Aug. 6} says: "The solubility of europhen in olive-oil renders it well adapted for injection into pus-cavities, sinuses, and fistulæ. The freedom from offensive odor is a point in its favor. An excellent property of europhen is that it will not harden into compact cakes upon the surface to which it is applied. As an antiseptic dressing it is of value, and the absence of toxicity is another point in its favor. The harmlessness and not unpleasant smell commend this substance in the surgical affections of children and in gynæcological practice. That

the mixture of europhen and aristol adds something to the efficiency of each is shown by a case of epithelioma, in which first one and then the other substance was used alone, without effecting much benefit, while the mixture speedily instituted a course of improvement. In some patients the powder acts more beneficially, while in others an ointment is productive of more favorable results. It may be necessary to increase or decrease the strength of the ointment, according to the circumstances of the case." The author has generally found that a proportion of 1 drachm (3.89 grammes) of europhen to the ounce (31 grammes) of the excipient makes an efficacious ointment.

A. Eichler,¹⁹_{July 9} reviewing the therapeutic uses of aristol and europhen, makes several statements in favor of the latter. He says that one of its chief uses is to supersede iodoform in venereal diseases, and that particularly in soft chancre it causes rapid healing. For such purposes, and for syphilitic skin eruptions, an ointment of 15 grains (0.97 gramme) of europhen to $\frac{1}{2}$ ounce (15.55 grammes) of vaselin or lanolin is of much service. Internally, the drug can be used in the treatment of syphilis, in doses of $\frac{1}{6}$ grain (0.011 gramme), increasing gradually to 1 and even 2 grains (0.065 and 0.13 gramme). The remedy is also useful as a local application in erysipelas, burns, and scalds. Here it can be employed in the form of ointment of the strength of from 3 to 5 per cent., or in a 2-per-cent. oil. Europhen has rendered great service in chronic nasal diseases, in urethral surgery, and in the treatment of granular and chronic indolent ulcers; and, in fact, in all those disorders in which a remedy is required to prevent decomposition or destroy pathogenic micro-organisms. I. A. Ezoff¹¹⁶_{No. 1} has found europhen to be an excellent antiseptic; a prolonged application, however, giving rise to local irritation. Iakimovitch, who made comparative clinical experiments with europhen and iodoform, concludes that the former ranks next to the latter as a surgical dressing.

O. V. Petersen, of St. Petersburg,⁵⁸⁶_{No. 2} has tried the drug (1) in 25 cases of circumcision. The wounds were powdered with the pure drug and dressed with sterilized gauze, the dressings being changed every day or two. In all but 3 rapid healing by first intention was obtained; in the remainder the wounds gave way in from two to four days after the operation (in 2 from violent

erections, in 1 apparently in connection with supervening influenza). 2. In 19 out of 20 cases of soft chancre the ulcers were simply wiped with a piece of absorbent cotton-wool and powdered with the substance from one to five times daily. In 1 of the cases (a patient with recurrent syphilis) the lesions healed in three weeks, but in the other 18 in from twelve to fifteen days. In the twentieth case the application of europhen was made after scraping out the chancres. On the removal of the dressing, on the fifth day, the ulcers were found firmly healed. 3. In 7 cases of hard chancres, and (4) in 3 of ulcerating gumma, good and fairly quick healing took place. 5. In 2 cases of suppurating buboes, after incision and scraping, the cavity was powdered with europhen and a compress applied for seven and nine days, respectively. Good union resulted, though in 1 of the cases dermatitis of the surrounding skin occurred. 6. In a case of whitlow a cure was effected in seven days with two dressings. On the whole, the author thinks that europhen is a useful substitute for iodoform in minor surgery and venereal ulcers. The smell is not at all strong, and can be disguised by the patient carrying about in his pocket a handkerchief scented with a few drops of lilac perfume.

Exalgin.—A most valuable paper on the therapeutic properties of this drug is contributed by John Gordon, of Aberdeen,⁶_{May 28} who gives in tabular form the results of his interesting observations. The diseases treated comprised: toothache, headache, facial neuralgia, sciatica, lumbago, intercostal neuralgia, locomotor ataxia, biliary calculi, rheumatoid arthritis, otitis media, and tubercular disease of the prostate. Records of 92 observations in all were kept, and 66 patients were treated by the drug. In 55 cases the action of exalgin was successful in relieving the pain, while 11 cases yielded results that were unsuccessful or doubtful. The benefit of exalgin was most marked in cases of nervous headache, facial neuralgia, intercostal neuralgia, and lumbago. Although the pain-subduing action of the drug may be feeble, it has given excellent results in certain instances. Another important contribution made last year upon this substance is that of T. Churton, of Leeds,⁶_{May 28} who treats especially of the action of the drug in cases of Graves's disease. The writer also discusses the toxic dose of exalgin, which, he believes, varies greatly for different persons. A woman aged 28, of fair complexion, having

typical Graves's disease, had, after some months, extreme exophthalmos and congestion of both conjunctivæ, with ulceration of the left cornea. Leeches, lotions, and other measures gave very little relief. At length, the pain becoming severe, exalgin was tried; $\frac{1}{2}$ grain (0.032 gramme) dissolved in 5 minims (0.31 gramme) of spirits of wine and a tablespoonful of water, every half-hour for three times, when pain was present. Next day, not only was the patient free from pain, but the congestion had entirely disappeared; the eyes had changed from flaming red to perfectly white. During the next month, to satisfy himself and several critical observers as to the influence of exalgin, further experiments were made, and all the other drugs and appliances likely to benefit were tested in turn. The result was always the same: when exalgin was given, the eyes were white; when it was omitted, they became red and painful within a day. The author mentions another case. A woman, having toothache, but otherwise healthy, had taken, on Thursday, at 5.15 P.M., an ounce (31 grammes) of a mixture containing 8 grains (0.52 gramme) of exalgin; at 5.30 a second ounce (31 grammes); and at 5.45 a third dose, or 24 grains (1.55 grammes) in half an hour. The woman was about 28 years of age, had very fair hair and complexion, was very intelligent, of quiet and pleasant disposition; had a large head, with relative small face, and gray eyes. She stated that after the second dose she felt dazed, but even after the third she was able to go out to call upon a friend half a mile away, though walking unsteadily and with difficulty, and fearing to speak lest she should say foolish things. On her return, in an hour, she felt giddy and stupid, but could do her work. On going to bed at 10 o'clock, she instantly fell asleep; awoke at 7 A.M. on Friday, with a dry mouth and frontal headache; no toothache; was better after breakfast, but the mouth felt still dry on Saturday evening. According to the author, there was no doubt of the quality of the drug.

He further states that exalgin has been found effective in cases of neuralgia, of headache, of (probably) cerebellar glioma, of lightning pains of tabes (two cases), of gouty arthritis, etc. The patient with Graves's disease resumed the use of the drug after an interval of a week, and for three days had 3 grains (0.19 gramme) every four hours; then, for a week, 4 grains (0.26 gramme) every four hours. After an interval of four days, she took 3 grains

(0.19 gramme) in one dose every four hours for ten days; afterward, as she could not be kept longer under daily observation, the quantity was reduced to 3 grains (0.19 gramme) three times a day. The corneal ulcer healed, and the pain and congestion were held in check by these doses, which were given in the hope of hastening the improvement of the original disease. They exerted little, if any, effect in this way, but no discomfort of any kind was caused by them. Exalgin does not seem to be in any sense a cumulative drug. The author has, however, heard of a case in which very alarming symptoms were produced by a single dose of 5 grains (0.32 gramme).

Two cases of chorea treated by exalgin are detailed by Moncorvo.⁶⁷_{May 30} The first case was that of a girl 10 years old, to whom a daily dose of 0.40 gramme (6 grains) was given. The patient improved under the exclusive use of the medicament, the total quantity administered being 8.40 grammes ($2\frac{1}{8}$ drachms), and the drug being well tolerated. The second case occurred also in a girl 8 years of age. The treatment in this instance lasted thirty days, with only one interruption of four days, and improvement followed. The total amount of exalgin employed was 13.70 grammes ($3\frac{1}{2}$ drachms), the minimum daily dose being 0.20 gramme (3 grains), and the maximum 0.60 gramme (9 grains). From the favorable results observed, the author affirms that exalgin is a valuable drug in the treatment of the chorea of Sydenham; that it is not only efficacious in controlling the choreic movements, but that it also relieves the other symptoms which accompany the disorder, such as mental troubles, insomnia, muscular weakness, and derangement of digestion. The author considers exalgin superior to antipyrin in the treatment of chorea.

Lowenthal,⁶_{Mar. 5} treated forty-five cases of chorea with exalgin, and in the majority of instances found that the sooner the treatment was commenced after the onset of the disease, the more efficacious did the drug prove and the more rapid was the recovery of the patients. In very bad cases the affection was apparently made worse by the drug in the first two weeks, but subsequently the patients improved. No severe untoward effects were produced by the medicament, with the exception, in a few cases, of headache, malaise, and vomiting. In three instances an intense jaundice was observed. The dose employed was from $1\frac{1}{2}$ to 3 grains

(0.097 to 0.19 gramme). Improvement was noticeable after 60 to 90 grains (3.89 to 5.83 grammes) had been administered. The author concludes that, though exalgin is serviceable in chorea, it is not to be considered as a specific for this affection. Parel³⁶²_{June 10;} ³¹_{June 16} calls attention to the incompatibility of exalgin and salicylic acid. He had occasion to prescribe for one of his patients, suffering from typhoid fever accompanied by a rebellious headache, cachets containing exalgin and salicylic acid, and noticed that when these substances were mixed in a mortar the mixture assumed the consistency of a soft paste, which became liquid shortly afterward. He argues, therefore, that combinations of the two drugs should not be prescribed in any form. The phenomenon described was not observed when the exalgin and the salicylate of sodium were put together.

While upholding the good effects of the drug in neuralgia and allied affections, Reginald Broadbent⁶_{July 20} believes that it is also capable of producing poisonous symptoms. He reports the following case as evidence that exalgin can cause untoward effects even in small amounts: A male patient, 26 years of age, and somewhat anæmic, had been suffering for a week from neuralgia of the left temporal region. He was ordered a dose containing 4 grains (0.26 gramme) of exalgin, to be repeated in two hours if unrelieved; and, if neither dose gave ease, he was directed to take two more doses of the same amount the following morning after breakfast. The patient took one dose, and obtained relief from the pain, but at the same time complained to his wife of feeling giddy, as if drunk. Next morning at 4.30, feeling a slight return of the pain, he took the rest of the medicine, which contained 12 grains (0.78 gramme) of exalgin. He immediately became dazed, clutched at the bedstead, but fell prostrate on the floor, where he remained quite unconscious for half an hour, and during this time frothed at the mouth. He was found on the floor, making a feeble effort to vomit. The pulse was feeble and slow; eyes closed; pupils natural. He was with difficulty made to answer questions, when he complained of pain in the region of the stomach and noises in the head. One-tenth grain (0.0065 gramme) of apomorphine given hypodermatically caused him to evacuate the stomach. Subsequently $\frac{1}{5000}$ grain (0.00013 gramme) of strophanthin with 10 minims (0.61 gramme) of ether were administered in the same

way, and the man slowly rallied. The pain in the stomach disappeared first, but the noises in the head remained for some time. Later, the patient could not remember events which occurred half an hour subsequent to his regaining apparent consciousness, and during this time he was constantly yawning. He had never had a fit in his life.

Firwein.—This name is given to a combination said to be made of phosphorus, iodine, and bromine. It occurs in the form of a liquid. Each drachm (3.69 grammes) of it contains $\frac{1}{100}$ grain (0.00065 gramme) of phosphorus and $\frac{1}{6}$ grain (0.011 gramme) each of iodine and bromine. William Pepper, of Philadelphia,¹¹²_{Feb.} has employed this preparation with good results in cases of torpid circulation with subacute gastric catarrh, and also in cases of subacute bronchitis with a relaxed and atonic state of the system. The remedy was well tolerated in most cases. The author suggests that the above ingredients be dissolved in simple elixir, in which case the preparation could be called "compound elixir of iodine," or "compound elixir of pine" if an elixir of balsam or of white-pine be used. He advises its administration, well diluted, after meals, in doses of 20 drops three times a day. This dose may be gradually increased, according to the tolerance of the stomach.

Gallacetophenone.—This drug, which is a derivative of pyrogallol, has been recently investigated experimentally by L. von Rekowski,⁶⁴_{July} who found that in dogs, in doses of from 30 to 60 grains (2 to 4 grammes) daily internally, and in rabbits in quantities of 15 grains (1 gramme), hypodermatically injected, the drug produced no evil effects. Von Ins tried it, in the form of ointment of the strength of 10 per cent., in the treatment of psoriasis with excellent results. The effects were manifest in twelve hours. Unlike pyrogallie acid, gallacetophenone does not discolor the skin, and is harmless. The drug is soluble in warm water, alcohol, ether, and glycerin.

Gallate of Bismuth.—See Dermatol.

Gentiana Quinquiflora.—This plant, according to J. R. Cross, of Beacon, Ia.,¹⁹⁹_{Mar.} is a reliable prophylactic against abortion and all uterine disorders. It is especially valuable in menorrhagia or metrorrhagia depending wholly upon systemic causes, such as phthisis, organic heart disease, hepatic disorders, anæmia, or ma-

larial affections, being peculiarly applicable in the last-named condition. It is said to act as a tonic and stimulant and not to produce depressing effects. The author uses a tincture prepared as follows: gentiana quinqueflora, bruised fine, 4 ounces (124 grammes); alcohol, 24 ounces (720 grammes); pure distilled water, 8 ounces (240 grammes). The mixture is allowed to stand for fourteen days; it is then filtered and ready for use. The tincture is given in doses of a tablespoonful every four hours.

Glucose.—See Lactose.

Glycerin.—Horace Y. Evans, of Philadelphia, ⁹_{Feb. 20} believes that the laxative action of glycerin is not confined to the parts with which it comes in contact. He relates the case of a woman, suffering from carcinoma of the fundus of the uterus, for whom he ordered a glycerin suppository inserted into the rectum for the relief of an accumulation of fæces. Within half an hour there was produced a copious semi-fluid stool through the uterus and vagina, but no discharge whatever from the rectum. An autopsy on the case subsequently showed that the diseased fundus of the uterus had become adherent to, and ulcerated into, the narrowed colon at its sigmoid flexure, almost severing the continuity of the bowel, detaching the mucous lining of the colon from that of the rectum, and totally obstructing the upper end of the latter by organized deposits. Thus it seemed to be proved that the action of the glycerin had gone beyond the rectum.

Guaiacol.—The action of guaiacol is discussed somewhat at length by Holscher and Seifert, ⁴_{Jan. 15} who show that the effect produced by the drug is not due to its action on the digestive organs; nor is it a specific against tuberculosis in the sense of limiting the growth of or killing the tubercle bacilli, as it does outside the body. It has been proved that in combination with the blood guaiacol has no such action. The medicament is eliminated as a salt of ethyl-sulphuric acid; and thus, when absorbed into the blood, it must have combined with albuminous bodies, and chiefly through the sulphur present in the albumen molecule. In the blood of phthisical patients there are, in addition, other albuminous bodies, namely, the products of the growth of the bacilli; and the authors contend that the absorbed guaiacol combines with these products and renders them harmless, and that they are further changed by oxidation, the guaiacol being liberated as a

salt of ethyl-sulphuric acid, and the other decomposition products being eliminated in the urine. The products of the bacilli bring about the fever, sweating, disordered digestion, etc., and with their destruction the ill effects pass away. From a series of careful clinical observations, Poggi⁵⁸⁹_{Aug. 10} has arrived at interesting conclusions regarding the therapeutic effects of this substance. He says: 1. Guaiacol administered by the alimentary tract is only partly absorbed. 2. It is more readily absorbed in healthy than in sick persons. 3. For its absorption it is sufficient to give it in daily doses of $\frac{1}{2}$ gramme ($7\frac{3}{4}$ grains). 4. Administered in such doses, it does not cause nausea, and is well borne by patients. 5. Guaiacol is not eliminated as such by the urine, but in the form of a body giving the reaction of phenol. William H. Gregg, of New York, ¹_{Nov. 21, '91} says that iodo-guaiacol is best prepared by adding 4 grammes (62 grains) of iodine to 32 grammes ($8\frac{1}{4}$ drachms) of guaiacol and applying a gentle heat. After the iodine is dissolved, 1500 grammes (50 ounces) of pure olive-oil are added.

Guaiacol Bi-iodide.—Vicario⁹⁹⁶_{Mar. 25} has called attention to this new pulmonary antiseptic, which is obtained from guaiacol by the action of caustic soda; the sodated guaiacol thus formed being afterward precipitated by a watery solution of sodated iodine, thus forming the guaiacol bi-iodide. The new drug occurs as a brownish-red powder, soluble in alcohol and in the oils.

Gymnema Sylvestris.—An active principle has been extracted by Merasingi⁸¹⁴_{May; July} from this plant and named gymnemic acid. It occurs as a greenish-white powder, of a sour taste; is soluble in alcohol, and only slightly so in ether and water. It is said that when gymnemic acid is rubbed on the tongue the sense of taste for sweet and bitter substances is completely blunted, so that sugar or quinine cannot be detected for several hours; but the ability to detect sour, salty, astringent, or pungent substances remains unaltered. The acid has, therefore, been recommended, especially by Quirini, in 12-per-cent. solutions in alcoholized water, for washing out the mouth before taking bitter substances.

Gymnemic Acid.—See *Gymnema Sylvestris*.

Gynocardia Odorata.—Y. Inoko, of Tokio, ²⁰⁰_{Oct. 24, '91} has written about the oil of this plant, which is administered internally, with good results, in chronic diseases of the skin, especially leprosy. He states that the oil contains a large quantity of sebacic acid,

this having the property of easily emulsifying the fats. The author does not believe that it has any specific action on the lepra bacilli, but that, acting as a tonic, it may increase the resistance of the tissues against the specific virus. He reports the case of a leprous patient, suffering from reddish-brown maculæ in the face, trunk, and limbs, and from anæsthesia of the skin, who improved remarkably after the use of the oil for a whole year. The maculæ almost entirely disappeared. The oil, according to the author, may be administered in doses of 2 grammes (31 minims) a day, and as the drug is apt to produce nausea and vomiting, owing to the presence of the sebacic acid, he recommends the use of but small quantities at the beginning of the treatment. The doses may be increased gradually.

Hæmoglobin.—Hæmoglobin as a nutrient in disease is highly extolled by W. Thornton Parker, ²⁰²_{Feb. 25} who calls the attention of the profession to the value of the different hæmoglobin preparations now found upon the market. In relation to the hæmoglobin compound, F. E. Stewart ¹⁷⁶_{Mar.} lays stress upon the fact that the dose of the preparation as commonly used by the profession is entirely beyond the necessities of practice. He states that in the majority of cases 5, 10, or 15 drops of the hæmoglobin compound given hourly answers much better than larger amounts administered at longer intervals. When larger doses are indicated, he suggests that the intense sweetness given the preparation by the malt contained in it may be agreeably disguised by the addition of ale, malt ale, or beer.

Hæmol and Hæmogallol.—These two substances, prepared by Merck according to the directions of Kobert, ⁶_{Mar. 6} are obtained from blood. Hæmol is a brownish-black powder and hæmogallol a reddish-brown. Their introduction into therapeutics rests on the fact that the derivatives of the coloring matter of the blood, obtained by the action of reducing agents, have a hæmatopoietic action both in health and disease. They are given in capsules, in doses of from 0.1 to 0.5 gramme ($1\frac{1}{2}$ to $7\frac{3}{4}$ grains) per day. Healthy persons are able to take as much as from 1 to 5 grammes ($\frac{1}{4}$ to $1\frac{1}{4}$ drachms) of hæmogallol. Hæmol contains traces of zinc left by design. The zinc is beneficial in slight lesions of the stomach which might result in ulcer. Given in the form of hæmol, the zinc loses its caustic action and does not cause nausea.

Helianthus Annuus.—The therapeutic properties of *helianthus* have been studied by our corresponding editor, Moncorvo, of Rio de Janeiro.⁶⁷³
Oct. He has used the sun-flower in the treatment of the miasmatic fevers of children. It was given to 150 children, of different ages, who exhibited well-defined symptoms of miasmatic febrile infection. The alcoholic tincture of the leaves and flowers was used in daily doses of from 2 to 20 grammes (31 grains to 5 drachms), well diluted; later, the alcoholic extract was administered in daily doses of from 1 to 5 grammes (15½ grains to 1¼ drachms), made into a potion. Both the tincture and the extract are tasteless and quite odorless, so that children take them more readily than quinine. The remedy is well tolerated by the stomach, and does not give rise to the least inconvenience. The therapeutic effects have been so uniformly excellent that the author thinks the drug merits further attention from physicians who practice in malarial districts.

Hydrastine.—See *Hydrastis Canadensis*.

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Hydrastis Canadensis.—Porak⁴⁷¹
Mar.15; July¹¹² gives the following results of his experiments with hydrastinine: Hydrastine is a heart-poison, acting on the vasomotor system centrally. It is an uncertain and dangerous remedy. Its derivative, *hydrastinine*, on the other hand, has no action on the heart, and its action on the blood-pressure is feeble. It appears to act directly on the capillaries, in some way not yet ascertained. Its vaso-constrictive power is much greater and more permanent than that of either hydrastine or ergot. Its action on the uterus is very slight. When a vigorous contraction of the uterus is desired, ergot is to be selected. In the hæmorrhages of puberty and the menopause, in those accompanying lesions of the appendages, and in the uterine congestion of dysmenorrhœa hydrastinine is preferable. In the case of uterine fibroids and endometritis its action is only palliative. It can be given in pill, capsule, or hypodermatically. In the latter way the remedy can be administered in doses of as high as 1½ grains (0.097 gramme). It is best to give frequent doses, continued for many days in succession. Its administration should be begun before the commencement of the expected menorrhagia.

In an extended article, Ed. Egasse⁶⁷
July 15,30 reviews the therapeutic uses of *hydrastis Canadensis*, following closely the essay of

David Cerna, abstracted in last year's ANNUAL. Besides the references to the literature of the subject given in this abstract, the author further mentions a number of writers whose contributions have appeared since. Thus, Bossi,¹⁶²₉₁ having employed the drug in a large number of obstetrical cases, concludes that its use is dangerous neither to the mother nor the child; that it exercises a curative and prophylactic hæmostatic action on the uterus during pregnancy and at the time of accouchement; and that as a hæmostatic it is decidedly safer in the hands of ignorant individuals and midwives than is ergot. His experience, he states, has been sufficient to warrant his recommending this drug, in the form of the fluid extract, in the hæmorrhages during pregnancy and during the puerperal period, in amounts of from 100 to 150 drops per diem, divided into five doses; as an immediate curative agent in hæmorrhage during accouchement, given to the extent of from 150 to 200 drops, in three or four divided doses; at the beginning of labor-pains in cases of placenta prævia; during dilatation, and in other cases; and, finally, as a prophylactic measure against the frequent uterine hæmorrhages occurring at delivery or post-partum in cases of hydramnion, uterine inertia, and excessive development of the fœtus and its membranes, or as the result of a profound anæmia of the patient or of the predisposition to flooding persisting from previous labors. Koeniger¹¹⁶_{No. 11, '88} recommends the fluid extract of hydrastis, 20 to 30 drops, repeated several times daily, in cases of hæmoptysis. Judson Palmer,²⁰²_{No. 3, '91} having observed the favorable local action of the extract of hydrastis upon inflamed mucous membranes, has used, with decided satisfaction, inhalations of a solution of the extract (1 part) in salt water (3 parts) in simple and tubercular bronchitis. Cruse has found the remedy a valuable means of arresting the sweats of phthisis, as well as a decidedly effective agent against hæmoptysis. Paul Strassman employed hydrastine, both by the mouth and hypodermatically, in some cases of menorrhagia. Three of these cases were under observation for too short a period to permit of being taken into consideration. The remainder of the cases were decidedly benefited by the drug, which was given in doses of from $\frac{1}{2}$ to $\frac{3}{4}$ grain (0.032 to 0.048 gramme) by the mouth, and in proportionate doses hypodermatically. Czempin has also used this drug in the same doses and in the same class of cases. P. Baumm¹¹⁶_{No. 12, '91} denies the power

of hydrastine to cause uterine contraction, ascribed to it by some authors; and he explains upon this ground the failure of the drug in cases of post-partum hæmorrhage. He does not regard it as superior to ergot in these cases, and advocates, instead of either drug, that the uterine cavity be tamponed and hot water used locally as a hæmostatic; otherwise he confirms the good opinions stated of hydrastine. Emanuel¹¹⁶_{Dec., '91} and Abel⁴_{No. 1} both highly value the drug for its hæmostatic powers, but do not lay any stress upon its oxytocic action; in fact, the latter author distinctly denies such a power, and advises its use in the hæmorrhages of pregnancy. Herzfeld states that, in the hæmorrhages arising from uterine deviations or from diseased states dependent upon serious abnormal puerperal conditions or blennorrhagia, hydrastine is far superior to ergot, and will control the loss of blood within a few days at most, if given in doses of 0.025 gramme ($\frac{2}{5}$ grain) four times daily. Faber¹¹⁶_{July} has used hydrastinine hypodermatically in thirteen cases of pregnancy; in one case without effect. In all the others contractions of the uterus were brought about. He also used it in nineteen cases of bleeding from non-puerperal uteri, and in fifteen of these cases obtained most excellent results.

Hydriodic Acid.—E. O. Thornton, of Philadelphia,²⁰²_{May 10} from his personal observations, has come to regard this substance as fulfilling the indications of an iodide quite as completely as does the iodide of potassium; further, having the very important advantage over this latter salt of not possessing a disagreeable taste.

Hydrochloric Acid.—S. Alkiewicz⁷⁸³_{Feb.}²⁶_{Apr. 1} recommends weak solutions of hydrochloric acid by internal administration as a brilliant remedy for nausea and vomiting, efficacious where such remedies as morphine, ice, and tincture of iodine have failed. He has tried this remedy with considerable success in cholera nostras, in refractory cases due to irritation of the gastric membrane by indigestible food, in the vomiting accompanying certain infectious diseases, and in the vomiting of pregnancy.

Hydrogen Peroxide.—C. M. Fenn⁸⁰_{Mar.}²⁰²_{Feb. 10} is enthusiastic upon the value of peroxide of hydrogen in the treatment of exposed wounds, on the ground that it forestalls suppuration and promotes cicatrization. He recommends the application of a 15-volume solution to the nasal membrane and the mucous membrane of the cervix uteri to remove adherent mucus for the purpose of medica-

tion. E. Stuver, of Rawlins, Wyoming, ⁸⁰_{Mar.} draws the following conclusions: 1. A reliable solution of peroxide of hydrogen is an efficient and safe germicide. 2. By its oxidizing power it rapidly decomposes pus, diphtheritic membranes, and other pathological decayed products. 3. It is an excellent deodorizer and a non-irritating, cleansing agent for foul wounds, abscesses, etc. 4. It is a valuable diagnostic agent in determining the presence of pus, and by its use in operations the danger of wounding important structures can be lessened. Graff⁸⁹_{No.2} has used it in cases where a complete opening of a fistula or abscess is impossible. Here irrigation with the peroxide has an excellent action, superior to that of other antiseptics. The great formation of gas which follows its contact with pus or blood permits a thorough cleansing. If, then, an antiseptic bandage be applied, healing takes place very rapidly. If, in cachectic individuals, the granulations are weak and slow in growth, one may alternate with injections of equal parts of ether and balsam of Peru. This procedure is of great value in suppurating cavities with indurated edges, as, for example, in the case of separation of sequestra. The remedy has also been used with success in dacryocystitis and purulent conjunctivitis. Where the drug is injected into cavities,—as, for example, after opening cerebral abscesses, pleural fistulæ, etc.,—one must see that there is free exit for the gas which⁴ quickly forms, as otherwise the pressure might cause trouble. In a discussion upon the employment of hydrogen peroxide, before the American Pædiatric Society, Jacobi, of New York, ⁹⁰_{May 19} called attention to a number of cases he had seen, in which the use of this drug in diphtheria had produced appearances which might have been mistaken for the original disease, but which had readily disappeared on withdrawing the peroxide. The disease had not only not been benefited, but had been prolonged by the use of the drug. Caillé, of New York, cited a case in which, thirty-six hours after using the peroxide of hydrogen in weak solution as a spray and gargle, a whitish veil appeared in the mouth, and then beginning ulceration and a pseudomembrane over these ulcerated spots. At the suggestion of Jacobi the peroxide was stopped, and the patient recovered. Blackader, of Montreal, suggested the possibility that the peroxide contained impurities of an irritating nature, these impurities being the salts and acids used in the production of the remedy in question, and which

in themselves must be poisonous. Seibert, of New York, had observed the same appearances described by Caillé as following the use of the peroxide. Although the drug was extensively advertised, he had never seen one scientific article in medical literature showing that it really did kill germs. Buckingham, of Boston, had used the 15-volume solution of peroxide of hydrogen in the form of a spray in the mouth and nose. He had not been able to trace any bad results. It seemed for a time to lessen the membrane, but the latter quickly returned. He was uncertain whether it had any benefit as far as the disease went. Koplik, of New York, had observed, in one case where he had used a spray of peroxide, a beefy color of the soft palate, followed by a milky pseudomembranous deposit. Huber, of New York, had seen, in a number of cases, the effects which had been described. Finally, Jacobi stated that the films seen were coagulated albumen, and that the injurious action of the drug was due to its destroying the epithelium, and thus favoring the formation of new diphtheritic deposits.

Other more or less valuable papers on peroxide of hydrogen have been published by W. S. Mullins, of New York ⁵¹⁶_{June 15}; Clark Townsend, of Cleveland, Ohio ²²²_{Feb.}; Herbert E. Smith and Horst Oertel, of New Haven ¹_{Aug. 6}; B. W. Richardson, of London, ²⁰⁵¹_{Vol. 14} and de Laval, of Montreal ²²¹_{Feb.}

Hyoscine.—Roberts Bartholow, of Philadelphia, ⁹_{Dec. 12, '91} discusses the action and uses of this drug. He says that in asylum practice the remedy has largely supplanted morphine in the treatment of acute mania, the violence of acute melancholia and of general paresis, and as a hypnotic in general. It is remarkable for the absence of untoward after-effects. According to the best authorities, hyoscine is most serviceable in cases of cerebral disease requiring an anodyne. After the administration of small doses of hyoscine in suitable cases the sleep produced is quiet and refreshing, and the system remains free from the after-headache, nausea, hebetude, and constipation that follow in the wake of opium and other narcotics frequently administered. It has been observed that when a dose larger than necessary is administered, the sleep is apt to be accompanied by jactitations, dreams, and considerable uncontrolled mental agitation; while if only an adequate amount is given, the result is far happier in the condition of the mind and

body, and the sleep is undisturbed by unpleasant symptoms. Bartholow is decidedly in favor of the administration of hyoscine in cases of senile trembling, paralysis agitans, and fibrillary agitation.

In cases of chorea, and of various spasmodic affections of the nervous and respiratory systems, he believes that hyoscine has a useful place as a remedy. It may be given hypodermatically, in doses of from $\frac{1}{300}$ to $\frac{1}{100}$ grain (0.00022 to 0.00065 gramme).

Hypnotics.—John B. Chapin, ⁵Feb. in writing on the abuse of hypnotics, reports seven cases, admitted as insane, in which the excessive amount of hypnotics, taken under medical advice, was an important factor in accounting for the condition. The symptoms were hallucinations, restlessness, motor disturbances, fear of impending calamity, manifest constitutional disturbances, sensory disturbances, suicidal attempts, and delusions. The physical signs were dilated, sluggish pupils; diminished mental reflexes; feeble heart-beat; flabby, coated, pale tongue, and tumid abdomen. In hospital practice the use of hypnotics, according to the author, is becoming less with each year, and private practice should follow that example. However, the increasing number of the insane cared for at home leads to more extended use of hypnotics, with great temptation to increase the dose when violent symptoms arise.

Hypnotism.—No very remarkable work has been done on this subject, although some able contributions have appeared. J. Babinski, chief of Charcot's clinic, ²⁴²June to Aug. has recently had the opportunity to review before the class the relative position of the schools of Paris and Nancy in regard to hysteria and hypnotism. As is well known, the followers of Bernheim at Nancy consider the hypnotic state a physiological phenomenon, capable of therapeutic application to the most diverse forms of disease; while Charcot's disciples at Paris are as certainly inclined to the belief that it is a pathological occurrence identical with hysteria, and capable of therapeutic uses only when employed against opposed symptoms arising from the hysterical state. There is no really new material in the lecture of Babinski, but it may not be amiss to refer to what he claims are proofs of the identity of hysteria and the hypnotic state. These are: 1. The existence of anæsthesia, relaxed paralysis, contractions, catalepsy, and

other somatic conditions in both. 2. Both conditions may be made to appear and disappear by psychic influence. 3. Both hypnotic and hysterical somnambulists may be thrown into a second psychic state. 4. In both cases the amount of urine may be observed to be diminished, as well as the urinary excreta, such as urea and the phosphates. 5. The therapeutic uses of hypnotism are almost limited to hysterical states. 6. There exists between hypnotism and hysterical manifestations an equilibrium analogous to that which may be observed among the different conditions dependent upon hysteria. 7. Sometimes the "hypnotic attack" is mingled with a hysterical attack.

The writer apparently discredits the results of the Nancy School, pointing to the benefits produced in the treatment of various forms of disease; or if he does not doubt the reality of the benefits, he at least questions the correctness of the diagnoses. He would not accept definitely the establishment of hypnosis until some of the somatic conditions, such as anæsthesia or contractions, could be induced by suggestion.

It is in diseases of the nervous system in which J. Luys recognizes ²⁴_{Feb. 29; Mar. 7, 18, 20} hypnotism's most potent influence; and not only in hysterical states, but also in grave and chronic affections, in certain cases of insanity, and in chorea, palsies, etc. He regards it in the light of a physical force, as real as the currents of electricity and as potent for good in the relief of disease. He earnestly denies, so far as his experience will point at least, the existence of a power for evil in it, as used by therapists. He induces hypnotism by the use of rotating mirrors, through a sort of fascination, and by other methods. An article of general importance, which, in a degree at least, upholds the views of the Paris school as to the uses of hypnotism being largely limited to hysteria, is published by Joseph Collins, of New York. ¹³⁸_{Apr.} Dujardin-Beaumetz ²⁰²_{May 10} covers precisely the same field, confessing his disagreement with the Nancy school upon the wide application of this measure, and apparently likening the hypnotic state to the manifestations of ordinary hysteria. A debate before the New York Neurological Society, upon the therapeutic applications of hypnotism, called forth expressions of more or less decided denial of its value from Dana, Jacobi, and Sachs. ¹_{Feb. 6} The chairman (Vought), Fischer, Leszynsky, Booth, and Mary Putnam Jacobi, however, expressed opinions

more favorable to its use. Of three hundred cases seen by Berillon ⁸_{No.4} in his clinic, more than one-third were hysterical. The author had good results in almost all from the use of hypnotism, and believes it is indicated (1) in the spasmodic attacks of grave hysteria and the paralyses following; (2) in mono-symptomatic hysteria; (3) in ordinary hysteria; (4) in hysterical insanity. Besides these, he has had good results in epilepsy, paralysis agitans, locomotor ataxia, hemi- and para-plegia, neuralgias, and mental diseases not referable to hysteria. Wm. Mosing ¹¹³_{No.2} relates several instances of the successful use of hypnotism in the treatment of disease, among them a case of choreic muscular spasm following an acute attack of rheumatism, and another of inability to walk following a severe fright.

Victor v. Gyurkovechky ¹¹³_{No.47} believes hypnotism to be a powerful therapeutic agent in the treatment of onanism, spermatorrhœa, and various forms of impotence, and relates several cases to fortify his position. He also banished persistent erotic dreams in a single lady of twenty by this means, after the sixth *séance*. Milnes Bramwell ²⁶_{June} details the account of a young woman suffering from anæmia, amenorrhœa, and intense headache. She had also a double strabismus. Hypnotism was easily induced, and, after suggestion, the headaches promptly disappeared. Anæsthesia was induced by hypnotism and the strabismus corrected without the recollection of the patient. From an accident she had the bones of the nose broken shortly afterward, but they were moulded into shape while she was in a state of hypnotic anæsthesia, without any recognition or recollection on her part. Finally, suggestion in this hypnotic state was made that, on a certain date (about the proper time for the appearance of the menstrual discharge, which had been absent for almost a year) and after the usual premonitory symptoms, the menses should be established. The flow occurred upon the date suggested. It was again suggested that the following menstrual epoch be without fail, and this was followed by the results suggested. Frederick H. Garrish ⁹⁹_{July 21} ²³¹_{Sept.} presented before the Maine Medical Association, at its last meeting, a review of the remedial uses of hypnotism. He claims to have practiced hypnotic suggestion nearly fifteen hundred times, and usually with very marked success. In various functional nervous disturbances, hysteria, insomnia, neuralgia, headaches, and in morbid mental

states bordering on insanity, he has witnessed decided benefit follow its use.

Ichthyol.—This drug has been found effective in the treatment of erysipelas by Stacquart, ²⁵⁶_{Jan.} who reports also a case of generalized pruritus which yielded in a few days to the application of a 10-per-cent. solution of ichthyol and baths with ichthyol soap. Good results were also obtained in another case of pruritus of the scrotum, and, in a third case, of dermatitis accompanied by suppuration.

Iodides.—Bacziewicz ⁸⁸⁷ has studied the absorption of iodide of potassium from the rectum of healthy and sick persons, reaching the following conclusions: 1. In eight healthy persons iodine could be discovered in the saliva in from five to nine minutes, the average being seven minutes. 2. In five patients with lesions about the rectum or in its neighborhood (cancer of the rectum, parametritis, retro-uterine hæmatocele, etc.) the absorption was retarded, the time varying between nine and fifteen minutes. 3. The same retardation occurred in seven patients with remote affections (acute nephritis, malignant disease of the stomach, cardiac organic disease, etc.), the time averaging about fourteen minutes. 4. When in the form of solution the iodide was absorbed by the rectal mucous membrane more rapidly than when in that of suppository, the difference amounting to several minutes. The iodide was introduced into the rectum either in aqueous solution—10 grammes to 50 cubic centimetres ($2\frac{1}{2}$ drachms to $1\frac{1}{2}$ ounces)—or in suppositories containing the same amount of the salt. The appearance of the iodide in the patient's saliva was detected by the starch-test. The same subject has been studied by Calantoni, ⁵⁸⁹_{Apr. 26} whose experiments were carried on in man and in animals. He summarizes his conclusions as follows: 1. The absorption of potassium iodide, when introduced into the rectum, is as rapid as when given by the stomach. Rectal injections of this drug may, therefore, be substituted for the ordinary methods of administration. 2. If it be desired to obtain a still more rapid absorption, the solution may be heated to from 35° to 37° C. (95° to 98.6° F.), the warmth producing a slight congestion of the mucous membrane, and thus favoring absorption. 3. The time during which elimination goes on is practically the same by either method of administration. With the weak solutions

ordinarily given, elimination is complete in from twenty-four to thirty hours. Concentrated solutions are excreted more slowly,—that is, in from thirty-eight to forty hours.

A Paris correspondent^{Feb. 6} calls attention to the subject of iodism, recently discussed before the Société de Thérapeutique. Constantin Paul asked Huchard if his enthusiasm for the sodium salt had not, as appeared from his recent utterances, somewhat cooled. Paul himself expressed his decided preference for the potassium salt, considering it to be vastly superior to its sodium congener. The discussion showed that there was a general consensus of opinion as to the inefficacy of the iodide of sodium in syphilis, and elicited further from Huchard the confession that his views were veering round in favor of the potassium salt. His chief objection to it was its occasional irritating action on the renal filter. The sodium salt was free from this objection, but must be used in much larger doses to produce equivalent results. He believes that in such diseases as angina pectoris and myocarditis general arterio-sclerosis is present, and consequently renal insufficiency, which the employment of the irritating potassium salt will aggravate. It is taught in the Paris school that iodism is more readily induced by small doses than by large ones. Recently, two German physicians, Rohmann and Malachowski, of Breslau, have been experimenting with bicarbonate of sodium as an antidote for iodism, believing that the ingestion of this salt, by rendering the blood alkaline, prevents the decomposition of potassium iodide and the consequent liberation of iodine in the free state. Two years' experience has convinced them that, in bicarbonate of sodium, given synchronously with potassium iodide, in two daily doses of 40 or 50 grains (2.59 to 3.24 grammes), an agent has been discovered capable of counteracting, or even altogether preventing, the development of toxic symptoms.

P. Heymann^{Feb. 11} related a case in which, some days after the omission of the iodide of potassium, which had been given for the treatment of syphilis, there occurred laryngeal œdema with stridor. Eight days later the affection disappeared. Lublinski has also observed laryngeal œdema in a patient, 36 years old, after the use of one spoonful of a 5-per-cent. solution of iodide of potassium. This author believes that the œdema is prevented by giving the medicament in milk.

Iodine Trichloride.—This substance is recommended by Bel-
field, of Chicago, ⁵⁹ July 16 for the treatment of tuberculous and suppurative processes. The drug is obtained by passing chlorine-gas over iodine, and occurs in the form of crystals; it is soluble in its own weight of water, and almost as readily in alcohol, and either solution can be mixed with glycerin without decomposition. The author believes it to be a powerful antiseptic, and has used, in irrigating suppurating wounds, a 1- to 5-per-cent. solution in water, with or without the addition of glycerin. It may also be employed for cancerous surfaces and venereal sores, in 5- to 20-per-cent. solution in equal parts of water, ether, and glycerin. Solutions stronger than 5 per cent. cause smarting in ordinary wounds. The author states that gauze sterilized by boiling and dried, after being immersed in a 1- to 10-per-cent. aqueous solution, retains iodine trichloride for an indefinite time.

Iodism.—See Iodides.

Iodoform.—Dury ²² July 27 employs a 10-per-cent. solution of iodoform in the treatment of goitre, synovial cysts, and hydrocele. He injects 2 or 3 drops of the solution into the base of the goitre; then, withdrawing slightly the needle, he pushes it in another direction; and so on, until a few drops are deposited in many places. A cure is rapidly obtained. Three cases of hydrocele were treated in a similar manner with excellent results. Little or no pain was produced. George H. Treadgold, of Port Huron, Mich., ¹⁸⁶ July has employed it with good effect internally in the vomiting of influenza. Good results have also been obtained in the treatment of digestive disorders of both adults and children. He reports a case of adult diarrhœa and two cases of infantile fermentative diarrhœa, and refers to fourteen more instances, in all of which the drug effected a permanent cure after other remedies had failed. He calls attention to a case of pleuro-pneumonia with congestion of the bowels, attended by vomiting and offensive alvine discharges, in which the persistent vomiting, the high temperature, and other untoward symptoms threatened a fatal issue. Three 2-grain (0.13 gramme) doses of iodoform arrested the vomiting and changed the character of the secretions, and in three days the patient entered upon convalescence. The author gives the drug in powder, mixed with sugar of milk, and in doses of from $\frac{1}{8}$ grain to 2 grains (0.008 to 0.13 gramme), according to the

age of the patient and the severity of the disease. The following case of poisoning by iodoform is reported by J. A. de C. Williams. ²²
June 20 A man, aged 50 years, who was suffering from an indolent ulcer of the leg, had an iodoform dressing applied. Next morning he complained that he had passed a very bad night; had been feverish and restless, and suffered from a burning heat in the region of the ulcer. A fine, red eruption was visible around the ulcer, whilst the tongue was furred, pulse accelerated, temperature 100.8° F. (38.2° C.), pupils dilated, and there was headache and disinclination for food. Fifteen days elapsed, and the iodoform was tried again. The powder was applied at 4 P.M., and about 11 o'clock on the same evening the burning sensation commenced, and continued to increase in intensity until about 5 o'clock in the morning, when he obtained some relief by cold applications. At about 10 A.M. he complained of excessive heat in the region of the ulcer; of headache, vertigo, and sickness of the stomach. The face was flushed, the tongue coated, pupils dilated, temperature 101° F. (38.3° C.), and pulse 120. There was an erythematous arcola around the ulcer, with a fine, red eruption extending up the leg, and maculæ exactly resembling petechiæ; and, altogether, the constitutional disturbance was alarming. Commenting upon the case, the author remarks that the marked features were the extreme local irritation caused by the iodoform on two occasions and the appearance of petechiæ the second time it was applied, although the drug is generally credited with anæsthetic properties, and is stated not to be an irritant by so high an authority as Binz. The local congestion he believes to have been caused by the stimulating action of the drug, resulting in a hæmorrhagic extravasation, as manifested by the petechiæ. This latter he considers a rare form of iodoform poisoning. P. Nacke ⁴
Feb. 15; June 15 ⁸⁰ reports a case of poisoning in his own person, which he attributes to iodoform. An eczematous eruption was bandaged with corrosive-sublimate dressings, and then dusted over with iodoform. Seventy-five grains (4.86 grammes) of pure iodoform were used, followed by a mixture of the same quantity with starch. The total amount employed was from 2 to $2\frac{1}{2}$ drachms (7.78 to 9.725 grammes). Ten days later, there suddenly occurred decided loss of consciousness, which lasted just four days. All memory and perception disappeared, so that the patient himself can remember almost nothing of the four

days during which this persisted, and can report the events only by referring to his physician and his wife. Even the memory of passing events as they occurred was lost; so that, just out of a sitz-bath, he would demand the bath again, quite unconscious that he had just enjoyed one. Faces were forgotten, and persons as well; repeatedly he asked his wife who he was, and sense of locality was so far gone that he believed himself in a hospital. Word-memory was lost, too, or there was utter inability to produce the words desired, and he called articles by wrong names. What he wished could only be learned by gestures. In general, he was quiet and had no hallucinations. Intelligence was much affected, as was also the temper. Now, he wept without cause; again, grew angry on slight pretext, or lay entirely apathetic. The disturbance of consciousness disappeared very slowly, although the physical strength was soon regained. Memory remained long impaired, every thought seemed to be erased; the simplest prescription could not be recalled. Memory of passing events was regained very soon. The sense of locality was still lacking and intelligence was weak. When consciousness had partially returned, there was a most unpleasant smell and taste of iodoform; the former became, later, an ill-defined balsamic odor, and, finally, one of ether or fresh air. An intense sleeplessness was most tormenting; nothing cured it, and it was accompanied by hypochondriasis. Subsequently, a treatment of mild baths and douches, massage, gymnastics, and a suitable diet produced a final recovery.

Iodol.—The therapeutic uses of this succedaneum of iodoform are extensively and intelligently reviewed in an editorial.¹⁹
The works of Vulpinus and Mazzoni, Wolf, Schmidt, Piermarino, Pick, Cervesato, Martin and Lublinski, Seifert, Szadeck, Arago, Talenti, Hoffmann, Glassner, Shetler and Purjesz, Stembo, and Valdez and Cerna are carefully considered, and from the evidence brought forward by all these researches the writer concludes, and properly, we think, that to-day iodol has an undoubted value as a therapeutic agent, and has obtained a permanent place in practical medication.

Iodozone.—Robin¹⁰³⁷
Aug. 26 described to the Société Française d'Hygiène a new combination of iodine, under the title of iodozone. It occurs in the form of a white liquid. It is a powerful disinfectant, and is claimed to be of great value in the treatment of wounds.

It has been employed with success in antiseptics of the mouth. It may also be used by inhalations in diseases of the respiratory tract. By this means large quantities of iodine can be introduced into the system without producing the irritation and caustic effects of the latter drug.

Ipecacuanha.—Edwin L. Morgan, of Washington, D. C., ⁸¹July, writes on idiosyncrasies exhibited toward ipecacuanha. He relates, as follows, a case that came under his own observation: To a woman, 48 years of age, suffering from bronchitis, he gave a 6-ounce (180 grammes) mixture containing 1 ounce (30 grammes) of the syrup of ipecacuanha. The patient was immediately seized with a violent, obstinate, and prolonged attack of vomiting each time she took a teaspoonful of the mixture. So susceptible was the woman to the smallest quantity of the drug, that the writer had to omit it from the cough-mixture altogether. He tried on the same case several experiments, always with the same result, though somewhat modified by the quantity used in each dose. The patient suffered from no other bad effects of the ipecacuanha.

Iron.—Wm. Thornton Parker, of Salem, Mass., ²⁰²Dec. 26, '91, believes that the succinate (hydrated) of iron is, beyond all doubt, the most palatable preparation of iron yet offered the medical profession. He states that the tasteless succinate, in combination with an elixir, is permanent under all circumstances. It is a neutral salt that is quickly changed by the digestive processes; so that the greater part of it is almost at once assimilated on reaching the duodenum, where the effects of iron are most required. He believes that, combined with syrup trifolium compound, the succinate of iron will be found without a rival in the treatment of rheumatism and the various forms of syphilis. It is similarly useful for the anæmia of chronic malarial poisoning, and is indicated in the treatment of erysipelas, pulmonary hæmorrhage, hæmorrhage of the bowels, and other intestinal disorders. In diphtheria and scarlet fever it will be found convenient and reliable, and can be freely given as a tonic during convalescence. The combination enhances the functions of assimilation and blood-making, and by its nervous action of an abnormal character is controlled; so that it is, he believes, the remedy *par excellence* in the treatment of neurasthenia. He recommends that it be given in small quantities at the beginning, gradually increasing the dose.

W. H. Dice, of Tina, Mich., ¹⁸⁶_{Apr.} publishes the correct formula for Howe's acid solution of iron, as follows: pure water, 2 pints (1 litre); nitric acid, $1\frac{1}{2}$ ounces (45 grammes); triturated sulphate of iron, 2 ounces (62 grammes). Stir occasionally for forty-eight hours, and then filter. The dose of this preparation is put down as two drops every two hours. The same acid solution is prepared by C. Fitz Henry Campbell, of Amhurst, Nova Scotia, ¹⁸⁶_{Apr.} as follows: sulphate of iron, 40 grains (2.59 grammes); nitric acid, 3 fluidrachms (11.09 grammes); distilled water, $1\frac{1}{2}$ ounces (44.35 grammes). Mix. The author prescribes this solution in certain forms of dyspepsia, with good effect. He administers it in doses of from 2 to 5 minims (0.12 to 0.30 gramme) in a $\frac{1}{2}$ -ounce of infusion of quassia. G. W. Weld, of New York, ⁸⁰ calls attention to the advantages of the syrup of the chloride of iron, and reports several cases in which it gave satisfactory results. It may be said that the syrup, in its therapeutic properties and value, is identical with the tincture; but it is claimed that as a restorative agent it is more easily assimilated, and more likely to be tolerated by the mucous membrane of weak stomachs than the old form of the chloride, while it is less harmful under prolonged use.

Jaborandi.—M. B. Ketchum, of Palo Pinto, Tex., ¹⁹²_{Mar.} favors the employment of pilocarpine in diphtheria, believing that through its action large quantities of diphtheritic membrane are expelled from the throat and nose; respiration becomes freer; fever abates; the appetite returns, and convalescence is established in from three to five days. The following formula is recommended: muriate of pilocarpine, $\frac{1}{8}$ to $\frac{3}{5}$ grain (0.008 to 0.04 gramme); pepsin, 10 to 12 grains (0.65 to 0.78 gramme); dilute muriatic acid, 2 to 3 minims (0.12 to 0.18 gramme); water to make 2 ounces (60 grammes). Of this mixture, doses of from 1 to 4 teaspoonfuls may be given in wine every one to four hours, according to indications. G. V. Hale, of Wheatland, Texas, ¹⁴⁴_{June} reports two cases of facial erysipelas in infants, accompanied by rise of body temperature and cerebro-spinal symptoms, in which good results were obtained by the use in diaphoretic doses of the nitrate of pilocarpine. The patients were markedly improved in from twenty to thirty hours and convalescent in a week. In these cases other measures had been employed without success. Under the action of the pilocarpine the progress of the dermal inflammation was

not checked, but the advancing line was only of a pale-reddish hue. The author also reviews the literature of the subject in regard to the use of jaborandi in the treatment of erysipelas.

Jequirity.—In writing on the action of this remedy in trachoma and pannus, W. D. Babcock, of Los Angeles, California, ⁴⁴_{July} says that if there be a safe remedy that may be used by the general practitioner it should be known, and he believes that this remedy is jequirity. Any one, the author states, who can treat a case of ophthalmia neonatorum can handle one of jequirity inflammation, and he thinks that no intelligent physician need hesitate to employ the drug. In most of the cases he has treated he had not seen the patient until after the inflammation had passed away. In only one case had there been the least anxiety, due to the patient exceeding the instructions; yet the result in this had been better than in any of the others. He could not agree with some authorities who regarded the remedy as dangerous, and believed that their cases had been unsuitable or that the drug had been used too freely. The writer employs an impalpable powder of the bean. The eye is dilated fully the day before, and kept so during the time that it is inflamed. About twice the size of a mustard-seed of the powder is dusted at bed-time into the eye, preferably on the everted upper lid. The operation is painless. If inflammation has not supervened by morning, some more of the powder should be applied, and in about three hours the inflammation begins. This is at its height in twenty-four hours, and continues for three or four days. Ten days after the first application an astringent will hasten recovery. Jequirity is a great searcher-out, and makes a clean sweep of the whole membrane; being, therefore, more thorough than the usual surgical treatment.

Kakodylic Acid.—According to some observers, kakodylic acid is a dimethyl-arsenic, containing about 50 per cent. of arsenious acid. It is prepared by the interaction of acetate of potassium and arsenic. It occurs in the form of bright, colorless crystals, is acid in reaction, deliquescent in moist air, but otherwise a stable substance, freely soluble in water, alcohol, glycerin, and other media. Louis Lewis, of Philadelphia, ¹⁸⁶_{Apr.} suggests the employment of this drug hypodermatically for the destruction of pathogenic germs, and believes that it may prove of value in the treatment of phthisis and allied disorders; in diseases of the skin, such as psoriasis,

lupus, pemphigus, and many parasitic and other cutaneous maladies, used both internally and externally. It may also be effective in the treatment of cancerous and malignant growths by virtue of its germicidal or other action. He advises the employment of a solution of kakodylic acid of the strength of 1 grain (0.06 gramme) in a drachm (3.70 grammes) of distilled water. Two minims (0.12 gramme) of this mixture may be used for hypodermatic injections. For internal administration, it may be given in doses of $\frac{1}{20}$ grain (0.0032 gramme), which represents about $\frac{1}{40}$ grain (0.0016 gramme) of arsenic.

Kola-nut.—But little has of late been written about this drug. It is now stated that, besides its alleged properties of increasing the capacity to bear bodily fatigue, it also allays appetite and assuages thirst. It is said to have been recently successfully employed, when in the form of a fluid extract, for the treatment of diarrhœa.¹²⁹
 From a careful study of kola, Monavon and Perroud, of Lyons, France, ²¹¹_{Nov. 15, '91} arrive at the following conclusions: 1. Kola-nut is more an anuretic than a diuretic; contrary, in this respect, to the property exhibited by caffeine. 2. The nitrogenous elements in the urine, as well as the phosphates, are markedly diminished by the absorption of kola-powder; which proves that the drug lessens tissue-waste, and is, therefore, an economical food-stuff, its action being exercised especially on the muscular and on the nervous systems. 3. The extract and powder of kola produce identical effects. 4. Kola-rouge exercises, similarly, a marked action on the elimination of nitrogenous substances and phosphates. 5. Caffeine has an action analogous to that of kola on organic tissue-waste; but this action is inferior to that effected by an equal amount of kola-nut.

From the results obtained, it is apparently proved by the authors that caffeine is not the sole principle contained in kola-nut, but that the nut has an action peculiar to itself, all its principles acting to produce similar effects. Through this influence, substances ingested into the economy are better utilized. In this way there results a diminution in the loss of the natural forces, and consequently a greater transformation of heat into mechanical work. The drug may, therefore, be considered as a *moderator of nutrition*.

In an elaborate physiological and therapeutic study of this

drug, Combemale⁶⁷_{Feb. 29} arrives at conclusions similar to those published by some previous investigators, but no less interesting and important. According to the author, the physiological action of kola-nut is due chiefly to the presence in it of caffeine. The aphrodisiac effects of the drug, its cooling influence, and other less-pronounced properties, are due principally to the essential oils and acids which the nut contains. The writer reviews at length the therapeutic action of the remedy and the researches of Cuneo, Le Jollee, Dujardin-Beaumetz, Huchard, Héricourt and Durian, Heckel, G. Sée, Firth, Manquat, Hamilton, Chambard, Hénin, and others. The drug has been especially recommended in cardiac diseases, particularly during the hyposystolic period. In such cases it is highly serviceable in combination with coca, squill, and digitalis, according, especially, to the formula of Huchard, which is as follows: tincture of kola-nut, 40 grammes ($1\frac{1}{3}$ ounces); tincture of coca, 30 grammes (1 ounce); tincture of squill, 20 grammes (5 drachms); syrup of laurel, 100 grammes ($3\frac{1}{3}$ ounces); Lunel wine, 500 grammes (1 pint). The mixture is well stirred, allowed to settle, and then filtered. The dose of this combination is from 2 to 3 tablespoonfuls a day during a period of eight or ten days. The drug appears to be of value in the various diarrhœas, owing, perhaps, to the tannin which it contains. In these cases it can also be given in the form of pills, using this combination: extract of kola-nut, 1 gramme ($15\frac{1}{2}$ grains); powder of kola-nut, sufficient quantity for 100 pills. These pills are administered at the rate of from 10 to 15 a day. For children, the medicament can be employed in the following form: extract of kola-nut, 1 gramme ($15\frac{1}{2}$ grains); syrup of quince, 60 grammes (2 ounces). A dessertspoonful of this potion should be administered in divided doses in the course of the twenty-four hours.

Lactic Acid.—At the Hamburg General Hospital, Zippel³³⁶_{No. 10} has observed some excellent results from the use of lactic acid in the treatment of various forms of tuberculosis. Especially favorable results were obtained from the application of gauze tampons soaked in the acid. For the purpose of exerting a more continuous action upon tuberculous fistulæ, the author experimented with lactic acid made up in the form of rods. These were prepared in the following manner: a paste was first made, consisting of gelatin, lactic acid, and water, each 50 grammes ($1\frac{2}{3}$ ounces), which

was rendered fluid by slightly heating, and 30 grammes (1 ounce) of menthol were added. The rods were molded, and preserved in an ice-box for twenty-four hours. They were next dried in an exsiccator (a tin box having a double perforated bottom) over chloride of calcium, and in from eight to ten days usually acquired the requisite consistence and contained about 40 per cent. of lactic acid. They were then covered with a layer of collodium, and could be well preserved in this form. Before the introduction of the rod into the fistula the point is cut off obliquely, in order that the paste may undergo solution from the point, and thus act, first of all, upon the deeper parts. After a few days the collodium envelope, now an empty sac, may be removed. In place of the collodium, the bougies may be preserved in oil or benzin to which 30 per cent. of menthol has been added. The addition of menthol diminishes the pain experienced from the lactic-acid application. It is further stated that, if the gelatin in the paste be replaced by starch and tragacanth, the rods become less elastic, but harder.

Lactose.—A number of experiments as to the diuretic effects of lactose in various diseases has been made by B. Vespa.⁵⁸⁹ Nov. 30, '91 Glucose was also studied. The author concludes, from the results of his investigations, that in ascites of hepatic origin (cirrhosis) the diuretic effect of lactose was almost *nil*, and in acute and chronic nephritis it was hardly appreciable. In pleurisy with effusion, on the other hand, and in cardiac disease with disturbed compensatory action, the diuretic effect of lactose and glucose was most marked. As neither of these substances has any bad effect on the heart or on the nervous system, either can be given at all times and in combination with any other remedy. The medicaments are well borne, and do not cause any disagreeable after-effects. In studying the diuretic action of milk-sugar in children, Alexander A. Kisel, of Moscow,⁵⁹⁰ 26 May 2 instituted a series of experiments. The patients were kept in bed during the whole of each experiment. The sugar was given in doses of from 10 to 30 grammes (2½ drachms to 1 ounce) a day. Each observation lasted fifteen consecutive days. From the results obtained in 23 experiments, it was found that in 9 of the cases the daily amount of urine increased, in 6 it decreased, and in 8 it did not show any alteration at all.

Lævulose.—This body, which is a form of grape-sugar, has recently been prepared ²⁶_{July} as a white crystalline powder, and is believed to be capable of advantageously substituting the older substance in the treatment of diabetes. The new preparation is quite soluble.

Lappa Officialis.—Burdock-seeds, by which common name this plant is known, are recommended by A. D. Ayer, of Connecticut, ¹⁹²_{Dec., '91} for the treatment of amenorrhœa and dysmenorrhœa, in which diseases, according to the author, the remedy acts as a specific and as a general uterine tonic. He has had very good results in the treatment of these maladies during a period of several years. He states that in many cases of dysmenorrhœa, accompanied by an undue sexual desire or an entire absence of it, burdock-seeds prove an effective remedy. He alternates the use of this remedy with that of *salix nigra*. He employs the burdock-seeds in the form of an elixir, in the dose of a teaspoonful an hour after each meal, and continues the treatment for a month. He recommends the use of lappa within a week of the time of the expected menstrual period. In young girls who have never menstruated, it may be given within a week of the expected time, based upon previous symptoms of approaching menstruation. In such cases the elixir is to be given in teaspoonful doses every two hours, and continued till the flow appears, or until the symptoms pass away. Franklin Martin, of Wardsboro, Vermont, ¹⁹²_{Dec., '91} praises lappa in the treatment of chlorotic girls suffering from amenorrhœa. He affirms that a tea of the seeds, used as hot as can be borne, will prove a most effective remedy in bringing on the menses.

Ledum Palustre.—According to Sznabl, ⁵⁸⁶_{No. 3}, ⁵⁵¹_{Aug. 24}, ⁶⁷³_{July} this plant is a sudorific. Meissner has found in its leaves an ethereal oil. In this, after long standing, there appears a sediment in the shape of camphor; also tannin, tar, citric acid, with a slight addition of other organic acids,—as acetic, formic, and valerianic,—a bitter extractive substance, and, finally, ericolin. It is said that this plant was employed as an expectorant by the Swedish physicians of the last century.

Lichens.—John W. Eckfeldt, of Philadelphia, ¹²¹_{Mar.} calls attention to the chemical properties and medicinal uses of many of the lichens. The *Rocella tinctoria* was formerly used in medicine,

and even at present is highly esteemed as a gargle in congestive forms of throat diseases. It is said to be likewise of value in tonsillitis and pharyngitis, if used in the incipient stages. The troublesome cough, caused by elongation of the uvula, has been speedily relieved by using a tincture made with this plant, either diluting it with an equal quantity of water and applying as a spray, or using as a common gargle. The plant has also decided diuretic properties, and, as a demulcent, it is claimed to be of service in the cough of phthisis and chronic bronchitis, as well as in other chest affections. The genera *Usnea* and *Alectoria*, according to the author, are especially serviceable as astringents in various hæmorrhages, given internally in the form of powder or tincture. The tincture is said to possess tonic effects, owing to the presence of cetraric acid. In hæmorrhoids the powder of the drugs, in the form of ointment, has given satisfactory results. The plants have been similarly lauded as possessing antispasmodic and anodyne properties, especially in diseases of the respiratory organs, such as pertussis. The properties of *Cetraria islandica* are well known to modern therapeutists. Another lichen, the *Evernia prunastria*, is said to have decided astringent properties, and, given freely in the form of decoction, to be a refrigerant in mild fevers. This plant contains an abundance of gum, and has been found of value as a demulcent in the treatment of chest affections. *Ramalina fraxinea* and other species, in the form of concentrated tinctures, have been highly recommended in chilblains, chapped hands, and excoriated surfaces. *Ramalina* has also some value as an alterative, and has been effectively employed, in the form of a decoction, in the treatment of scrofula. The *Parmelia rotundatus* is given in India as a restorative and febrifuge in febrile disorders of paludal origin, and externally in scaly affections of the skin, and again in diarrhoea and dysentery as an astringent. According to Sanders, the *Theloseistes parietinus*, as well as other species of the same genus, is, in the form of powder, more efficacious than quinine in the intermittent fevers of autumn and in the rebellious quartans so frequent in the lowlands. The taste of the drug resembles that of Peruvian bark, to which, in fact, it is analogous, but it does not contain any alkaloid, and only an essential oil. The *Sticta pulmonaria* is used as a substitute for cetraria, but is inferior to it. In Siberia the sticta is commonly prescribed for disorders of the liver and

for jaundice dependent on catarrhal complications. The *Peligeria aphthosa*, as its name indicates, is used with effect in mycotic stomatitis in children, being locally applied in the form of a decoction, and causing a speedy removal of the fungus. Given in doses of from 10 to 12 grains (0.64 to 0.77 gramme), morning and evening, for a period of from four to six days, the powder of the plant is said to act as a good anthelmintic. It is said also to possess emetic properties. *Peligeria canina* is a nauseating species, and *Pertussia fagina*, which has some astringent properties, has been mainly used, especially in France, in the manufacture of oxalic acid. The reindeer-moss, or *Cladonia rangiferina*, is considered to be one of the most highly nourishing lichens, provided it can be deprived entirely of its bitter principle. This drug is said to be demulcent, tonic, diuretic, anti-hæmorrhagic, and alterative. Finally, the *Cladonia pyxidata* is employed in paroxysmal affections, such as convulsions and whooping-cough; in excessive nervous states, and in hysteria of anæmic women. It is also of value as an astringent and a febrifuge. It can be given in the powdered form or, preferably, in decoction.

Lysol.—According to Cadéac and Guinard,²¹¹_{June 20} who have made a special investigation of it, lysol is an imperfectly-defined product obtained from tar-oils by boiling with alkalis and fats, and contains about 50 per cent. of cresol. They found that with the 1-per-cent. solution the pyocyanic microbe is destroyed in from three to four minutes and the bacillus coli communis in from four to five minutes. The blood of a guinea-pig that had died from a carbuncle within twenty-four hours, was sterilized in one minute by the solution, but no apparent effects were produced on the microbes of pus after a contact of twenty-five minutes' duration. A 3-per-cent. solution was able, in half a minute, to kill the pyocyanic microbe, that of carbuncle, and the bacillus coli communis, but it required thirty minutes to produce the same effect on the micro-organisms of pus. These latter germs are very resistant to the action even of a 5-per-cent. solution. From these results, it would seem that lysol cannot be considered as a universal antiseptic. The authors agree with Schatellius, that lysol does not possess toxic properties in the case of the rabbit. They have found, however, that a daily amount of 8 grammes (2 drachms) of a 4-per-cent. solution is poisonous to dogs; and that

this amount given at one dose proved fatal to a dog weighing 12 kilogrammes ($26\frac{1}{2}$ pounds). Finally, the authors incline to the belief that lysol is a microbicide superior to phenic acid, creolin, cresyl, and other similar products. They suggest that it may be employed as a prophylactic measure against epidemics of epizooty, and particularly as a local disinfectant for wagons, cess-pools, vessels, stables, cattle-houses, etc.

An editorial writer discusses the recently-published investigations of Pee, ¹⁹_{June 18} made in the Berlin Obstetrical Clinic. This author has used lysol in about 550 cases, including 300 cases of childbirth, 200 abortions, and the remainder lacerations of the perineum. In 23 cases of septic abortion a removal of the septic matter followed the use of a 1-per-cent. solution of lysol, and the temperature was brought down to normal in the course of twenty-four hours. It cannot be said that in these cases lysol was the sole factor in saving the patients' lives, yet it must, nevertheless, be conceded that the uniformly excellent results when the drug was used speak eloquently in its favor. Lysol, therefore, is to be recommended for its powerful antimycotic properties, its relative freedom from danger, its easy solubility in water, its cheapness, and its remarkably convenient applicability. The only disadvantage is its unpleasant odor.

E. von der Goltz ²²⁴_{Feb. 27} considers it as valuable an antiseptic as corrosive sublimate in gynæcological and obstetrical practice, while it does not possess the toxic properties of the latter medicament. In emergency cases, especially, he believes it to be of the highest value. The author employs only 5-per-cent. lysol gauze, which he also uses in small pieces instead of sponges. For emergency cases, as in obstetrics, he has used with most satisfactory results pure cotton dipped for about twenty minutes in a hot 2-per-cent. solution of lysol. He reports the case of an inoperable carcinoma cervicis, in which the bad smell of a putrid vaginal discharge ceased after an irrigation of thirty minutes with a $\frac{1}{2}$ -per-cent. solution of lysol. He believes that the drug is non-irritant, producing at most a slight burning sensation for about ten minutes after the use of a $\frac{1}{2}$ - to 2-per-cent. solution of the drug. After recording the history of three interesting cases of dysentery and cholera nostras, in which excellent results were obtained by the use of lysol, von der Goltz ⁷⁶⁰_{Oct. 1} also recommends this drug in the treatment of cholera

Asiatica, and advises: 1. To give immediately a stimulant mixed with 2.50 grammes (38 grains) of lysol. 2. To wash out the intestines thoroughly with a 1-per-cent. solution of lysol in warm water. This treatment should be repeated every two hours until a change is seen.

Massage.—George H. Taylor¹_{Apr. 2} has contributed an article upon massage, treating entirely of the vibratory method of its application. He states: 1. Vibration may be so applied as to impress the sensory nerves principally. This takes place when the impingement is on the skin; and by this means, therefore, the nutrition of sensory nervous tissues, conductors, and centres is increased. This effect is easily carried to an unhealthy degree, to the detriment of other functional parts. Vibration may also be applied so as practically to omit the nervous sensory tissues. In this case the excess of nerve-nutrition and the irregular, obstinate, excessive, and morbid manifestations of nervous power are diminished and permanently remedied. This effect of vibration has extensive application in nervous affections and in the chronic disorders which are the usual accompaniments of nervous diseases. 2. The remedial effects of vibration are by no means restricted to functional diseases. Vibration is not exercise, and, since the will is not engaged, causes no fatigue. The rate of vibratory motion is incompatible with muscular nutrition, which requires a slower rate. 3. Vibration may be regarded as a specific in all chronic inflammations, of whatever part of the organism, and whatever may be the morbid product developed therefrom. The several effects of vibration which are conjoined in producing this remedial consequence may be noted. One is thorough diffusion of the circulation,—increasing the amount of blood at will in any desired region of the body, and correspondingly diminishing it in other regions, especially in that suffering from inflammation. Another is the urging forward, from the affected region, of the obstructing contents of capillary vessels, including both morbid, chemical, and other materials, thereby allowing interstitial, effused materials to return to the circulation, and permitting the swelling to be removed. Intimately connected with these is the modification of the pulse-rate, which is never quickened, and in all cases of abnormally high pulse is diminished,—in pulmonary affections to the extent of 15 or 20 beats a minute, this effect often becoming permanent.

Matzol.—Marker G. Dadirrian, of New York,⁶⁵_{Jan.} describes the uses of this substance. Matzol is a mixture of codliver-oil and matzoon. It consists of 50 parts of pure Norwegian oil and 45 of matzoon, with 5 parts of emulsifying ingredients. Matzoon is fermented milk. It is said that in matzoon, during the fermentation of milk, the milk-sugar is converted into lactic acid and the casein is minutely subdivided. Matzol can be administered in every case in which the use of codliver-oil is indicated. Kept in a moderately cool place or cellar, it will last for one year without becoming rancid.

Menthol.—At the meeting of the British Medical Association, held between the 26th and the 29th of July last, at Nottingham, Brookhouse³⁵_{Aug. 3} called attention to the parasiticial powers of menthol, a remedy that may be daily applied through the trachea in the treatment of pulmonary consumption, using doses of 4 grammes (62 grains) of a 12-per-cent. solution made with sterilized oil. Administered in this manner, the drug was well borne by patients, and under its use the cough, expectoration, night-sweats, the hectic fever, and even the emaciation were diminished. The observations were made at the Nottingham Hospital. The value of menthol is well established, especially in laryngeal phthisis, and in pulmonary tuberculosis it is worthy of trial by the method indicated.

Mercury.—A new method of blistering is recommended by Aubert, of Lyons.²⁶_{May 2} It consists in the application of a compress soaked in a 1-per-cent. solution of corrosive sublimate, which in the course of six or seven hours produces a blister similar to that caused by cantharides, but the pain is a little more severe. The action of the vesicant is limited by the use of diachylon plaster, in which an opening has been made equal to the size of the blister required. Over the opening a compress soaked in the solution is applied, and is covered with impermeable tissue. Aubert has found such blisters very useful in the treatment of syphilides, and especially of syphilitic acne. A. Hanbury Frere, of Bradford,²⁶_{Mar.} recommends the employment of the biniodide of mercury in cases of ptomaine poisoning, referring also to a paper by Luff.⁶_{Dec. 20, '91} Frere affirms that the biniodide of mercury precipitates and renders inert the milk or cheese ptomaine, tyrotoxin.

A new salt of mercury, prepared by V. Tokayer,²⁹⁶_{Apr. 24;} ⁶⁷³_{Aug.} is the

pyroborate, which appears in the form of a brown, amorphous powder, insoluble in water, alcohol, and ether. It has been used with good results in the form of ointment, with lanolin, of the strength of 1 in 50 parts. The succinimide of mercury has been employed hypodermatically by Julien. ^{296 673}_{Apr. 24; Aug.} The lesions of most of the syphilitic cases treated were those belonging to the second variety. In 26 cases the author employed 581 injections; that is, an average of 22 injections per case. These were not painful nor irritating, as long as the succinimide used was not obtained from the succinimate of ammonia. One daily injection was sufficient, the remedy being well borne by the patients. When the drug was administered by the stomach, the treatment was prolonged; and, for this reason, the author believes that the hypodermatic method is preferable. It produces no salivation. The following formula is advocated: succinimide of mercury, 0.25 gramme (4 grains); distilled water, 100 cubic centimetres ($3\frac{1}{3}$ fluidrachms). Each cubic centimetre of this solution contains 0.0025 gramme ($\frac{1}{25}$ grain) of the active salt. The author injects from $\frac{1}{2}$ to 1 Pravaz syringeful, or at most 0.0025 gramme ($\frac{1}{25}$ grain), a day. A Pravaz syringeful holds about 15 minims (0.90 gramme). According to Bocquillon-Limousin, ⁶⁴_{July}, one of the best methods to prepare the succinimide of mercury is the following: Let pure, dry ammoniacal gas act on anhydrous succinic acid; water is formed, and the temperature is raised; distill this, and the succinimide will be obtained in the form of crystals. To prepare the mercurial salt, put the succinimide in boiling water, and add, little by little, red oxide of mercury until saturation; filter, and, upon cooling, crystals will be obtained.

S. Lustgarten ¹_{Mar. 12} lauds the tannate of mercury in the treatment of syphilis. The salt can be prepared in two ways, of which the author prefers the following: Precipitate a concentrated solution of tannic acid by means of freshly-prepared acid nitrate of mercury dissolved in water, and dry the precipitate at a low temperature. Another method is as follows: Rub together tannic acid and acid nitrate of mercury; wash and dry. The writer has used the tannate of mercury in about three hundred cases. In order to bring about the most favorable results in the treatment of syphilis, it is of the greatest importance, according to the author, that the first treatment after the appearance of the secondary erup-

tions be as energetic as possible, and, if practicable, that it always be a course of thirty to forty inunctions. The subsequent treatment consists in the internal administration of 3 to 5 grains (0.19 to 0.32 gramme) of the tannate of mercury, continued for one month at a time, with increasing intervals of from one to three months. The salt has also given satisfactory results in the recurrent forms of the secondary stage and in the third stage. The iodide of potassium can also be given, if the precaution be taken to leave an interval of several hours between the alternating doses,—for example, in the morning a dose of iodide of potassium, three hours afterward the tannate, six hours later another dose of the iodide, and before retiring a second dose of the tannate. The daily dose of the salt for adults is 3 grains (0.19 gramme), which, if well borne, can be increased to 5 grains (0.32 gramme), or even more. One course of treatment consists of from 100 to 150 grains (6.48 to 9.72 grammes). The drug does not cause disagreeable symptoms, and the author affirms that in his hands the tannate of mercury has proved the most efficacious preparation in the treatment of syphilis. T. J. Walker, of London, ²_{Nov. 28, '91} reports a case in which ptyalism was produced by the local application of lotio hydrargyri nigra. The preparation was recommended to be used for acute eczema of the arms and legs. The disease rapidly improved, but the constitutional symptoms of mercurial poisoning, especially ptyalism, set in, although under proper treatment the patient made a thorough recovery. The author, commenting on the case, asks whether the insoluble black oxide could have united with some organic acid contained in the serous discharge and formed a soluble and readily absorbable salt?

Methacetin.—The action of various specimens of methacetin on protozoa, chiefly on a variety of *paramacium*, has been studied by Roncagliolo. ⁵⁶⁵_{Mar. 15} He used the method recommended by Brunton, and found that methacetin derived from different sources varied considerably in its effects on these low organisms, some specimens producing slowing of ciliary movements in twenty-four hours and causing death in forty hours, and other specimens being followed by no apparent ill effect. He argues from this, that the greater toxicity noticed indicates the probability of the occasional presence either of undetermined isomers possessing a different action, or of other substances allied to methacetin, but of greater toxic power.

Methylacetanilid.—See Exalgin.

Methyl-Blue.—See Aniline.

Methylene Blue.—See Aniline.

Milk-Sugar.—See Lactose.

Mistletoe.—See Viscum Album.

Morphine.—See Opium.

Morrenia Brachystephana.—Pedro N. Arata, of Buenos Ayres, ¹²¹_{June} describes the medical properties and chemical constituents of this plant, which belongs to the Asclepiadæ, and grows in the Argentine Republic and other South American countries. He has extracted from the fruit an alkaloid of a dark-red color, pleasant smell, and very bitter taste; soluble in water, chloroform, and amylic alcohol. Besides this alkaloid, the fruit contains a glucoside, which, if not identical with, is very nearly related to, the glucoside isolated by List from *Asclepias syriaca*. The physiological action has not yet been studied, but Arata concludes, after the use of a fresh infusion, that the plant possesses valuable galactagogue properties. Following the studies of Arata, Enrique E. del Arca, of Buenos Ayres, ¹⁰⁵⁰_{May} makes a special investigation regarding the therapeutic properties of the plant,—called by the laity *tasi*, or *tasis*. The author confirms the observations of Arata in regard to its galactagogue properties, having witnessed them in 15 cases, in women varying from 20 to 40 years of age. Three of these were primiparæ and the rest multiparæ. Not a single one of them suffered from any disease to which the lack of proper secretion of milk was due. In 2 of the cases agalactia came on between the twentieth and thirtieth day after confinement; in 10 the condition appeared between the thirtieth and sixtieth day; and in the other 3 instances, it appeared between the sixtieth and one hundred and twentieth day. Favorable results were obtained in 11 cases, doubtful in 2, and negative in 2. The medicament was given in the form of an infusion, prepared by placing one-half of a fruit in a litre (1 quart) of water, and then boiling it; or, 30 grammes (1 ounce) of the root or leaves were ordered to be taken in the twenty-four hours, according to the method of Arata. The leaves, root, and fruit are the only parts of the plant to be used. Del Arca refers to a case of Arata's in which the medicament failed to produce the desired effect, but caused instead a remarkable polyuria, which lasted while the remedy was being

taken. Another interesting case is related by del Arca. A woman, 28 years of age, of a robust and healthy constitution, had never suffered from any serious disease. She had borne three children. The first two she did not nurse for lack of breast-milk, as, twenty days after confinement, the lacteal secretion diminished, and, finally, stopped altogether. In the last confinement she experienced the same trouble; but she now tried morrenia. Under the influence of the drug, the secretion of milk returned so completely that the child during the first month was gaining in weight at the rate of 30 grammes (1 ounce) a day. She stopped taking the remedy for two days, and again the secretion diminished, but was re-established on the re-administration of the tasi.

Naphthocresol.—The value of this new antiseptic has been studied by Cadéac and Guinard.²¹¹
June 26 The authors found that, in the strength of 5 per cent., naphthocresol may be considered a reliable antiseptic. In solutions of the strength of 1 per cent. it is more powerful than lysol, sterilizing the microbes of pus in the course of fifteen minutes, while solutions of the strength of 3 per cent. produce the same effect in less than six minutes. Naphthocresol is not poisonous, as very large doses are required to cause lethal effects. It was impossible to kill animals by it when administered by the stomach, since it always produced vomiting, even when given in very diluted form. Watery solutions are non-caustic and non-irritant to wounds. The authors have employed naphthocresol clinically in the treatment of skin diseases, such as eczema of dogs, in catarrhs of the ear, in wounds, and to wash out the vagina and uterus, and with no unfavorable results. For the purpose of prophylactic disinfection they consider it superior to creolin and cresyl.

Naphthol.—At the meeting of the Manchester Medical Society, held February 3, Mules²
Feb. 27 read an interesting paper on the action of naphthol in catarrhal affections of the intestines and in typhoid fever. The author arrived at the following important conclusions: In non-specific diarrhœa of children and adults, associated with offensive stools, naphthol acts rapidly, restraining the looseness and deodorizing the ejecta; it appears to be antiseptic only in so far as it prevents the ill effects of toxins on the temperature of the body. In enteric fever it arrests diarrhœa at once, and, by neutralizing the toxins, shortens the pyrexial stage, cutting the

fever in many cases down to a fourteen-day course; but there is no evidence that it acts in any way on the typhoid bacillus, that it prevents ulceration, or that it lessens the risk of perforation or hæmorrhage. The drug can be given, according to the author, in milk, pill, or capsule, in doses of 1 grain (0.065 gramme) for children, 3, 5, or 8 grains (0.19, 0.32, or 0.52 gramme) for adults, every three hours. The antiseptic action of naphthol has been studied by Stackler and Dubief.⁶⁷_{June 15} The authors prepared two 5-per-cent. solutions of naphthol, one cold and the other at the temperature of 36° C. (96.8° F.). These solutions were then applied, in the proportions of 1, 2, and 3 cubic centimetres (16, 32, and 48 minims), to cultures containing the following microbes: the bacillus of Asiatic cholera, that of typhoid fever, the bacillus pyocyaneus, the staphylococcus aureus, the carbuncle bacterium, the microbe of herpes tonsurans, and the penicilium glaucum. Under the action of 1 cubic centimetre (16 minims) of the cold solution, the cultures were unaffected; under that of 2 cubic centimetres (32 minims), those of Asiatic cholera, typhoid fever, and herpes tonsurans were retarded; under the action of 3 cubic centimetres (48 minims), those of typhoid fever, the staphylococcus aureus, the bacillus of carbuncle, and the bacillus pyocyaneus were retarded, while those of Asiatic cholera and herpes tonsurans were arrested. With the solution at 36° C. (96.8° F.), the results were more decided; 1 cubic centimetre (16 minims) of this was sufficient to retard all the cultures, except that of the bacillus pyocyaneus; 2 cubic centimetres (32 minims) produced an arrest of all the cultures.

Nettle.—The active principle of the nettle has been studied by Oddi and Lomonaco,⁵⁸⁹_{Apr. 12} who experimented upon frogs and mammals with an aqueous extract. In frogs the drug produces paralysis of central origin, and the heart is slowed and finally arrested in diastole. In mammals the general effect is, however, but slight; but, by artificial circulation through the vessels of isolated organs, the authors demonstrated a powerful vaso-constrictor action, which was greater if some antipyrin had been previously circulated through the organ. They have also isolated a nitrogenous, crystalline, alkaloidal body, which is lethal to frogs in the dose of 0.01 centigramme ($\frac{1}{10}$ grain).

Nitrites, Nitro-Glycerin.—Kenelm Winslow, of Newton, Mass.,⁹⁹_{Apr. 14} after examining carefully the literature of the subject,

states that the therapeutic indications for the employment of the nitrites may be put down as follows: To dilate the peripheral arterioles and equalize the circulation in internal congestions; to stimulate the heart; to relieve spasm of vascular, nervous, or muscular origin; to increase the quantity of urine and diminish the amount of albumen in it; possibly, to relieve pain. The author further states, after examining the toxicology of the subject, that, although symptoms of poisoning have been many times reported as following the administration of ordinary therapeutic doses of the nitrites, we have yet to learn of any case proving fatal.

C. S. Stewart, of Amite City, La., ⁹_{Dec. 5, '91} reports a case of hemiplegia, and another of epilepsy, in which nitro-glycerin acted as an excellent cardiac tonic. In a third case, one of weak heart following an attack of influenza, the drug relieved the distressing dyspnoea most promptly and wonderfully. In cases of nephritis accompanied with dyspnoea, in which the use of opium or morphine is contra-indicated, nitro-glycerin is of the greatest advantage, and produces prompt relief. Chas. L. Kerr, of Falls City, Nebraska, ¹⁸⁶_{Mar.} reports his experience with nitro-glycerin in cases of angina pectoris. He says that 1 or 2 minims of a $\frac{1}{2}$ -per-cent. solution, given during the paroxysm, will often act when the nitrite of amyl has failed. He employed it, however, principally between the attacks, preferring the amyl nitrite for the attacks themselves, owing to its promptness of action when it is of any avail. He has obtained excellent results from the use of nitro-glycerin in neuralgia, migraine, reflex vomiting, epilepsy, sea-sickness, gastralgia, hiccough, laryngismus stridulus, tetanus, hydrophobia, hepatic colic; asthma of spasmodic, uræmic, or cardiac origin; simple and pernicious anæmia; acute and chronic Bright's disease; puerperal and uræmic convulsions. He even believes that the cold stage of an intermittent fever may be aborted by the timely administration of nitro-glycerin. He administers it internally or hypodermatically. G. L. Peabody ⁵⁹_{Aug. 20} has related two cases in which the dose of nitro-glycerin was far above that usually laid down in the text-books,— $\frac{1}{100}$ grain (0.00065 gramme). One patient, with diffuse nephritis, mitral insufficiency, and arterial sclerosis, gradually ran up to 2 grains (0.13 gramme) every two hours. This quantity alone controlled the symptoms, and without causing bad effects. The second case was one of Bright's disease, with pulse of high ten-

sion, and occasional attacks of profuse and painful vomiting. In this instance the dose was run up to 1 grain (0.065 gramme) every three hours, day and night, for several weeks. The pulse improved in tension very much; but occasionally it would return to its original condition, and the patient would then have attacks of persistent vomiting, lasting, perhaps, three days, and controlled only by enormous doses of morphine hypodermatically administered. During the attacks of vomiting the nitro-glycerin was given in the same doses subcutaneously. This is exceedingly interesting from the fact that some individuals cannot take even $\frac{1}{100}$ grain (0.00065 gramme) of nitro-glycerin without unpleasant effects.

Nux Vomica.—From a special research upon the subject of the actions of certain drugs on the constituents of the gastric juice, Wagner ³⁶⁰ Feb.; Feb. 27 arrives at the conclusion that the tincture of nux vomica acts favorably in hypopepsia, both as regards the quantity and the quality of the secretion. In apepsia it is without effect, and in hyperpepsia it is contra-indicated. In one case the qualitative hyperpepsia became quantitative, which, according to Hayem, is the worst form to treat. The experiments of Wagner are in accord with those of Gamper, who found that, under the influence of strychnine, there was a considerable increase in the secretion of gastric juice and of hydrochloric acid, and that it also increased the movements of the stomach. *Nux vomica* is recommended by Arthur Wigglesworth, of Liverpool, ² Nov. 28, '91 as a prophylactic in chloroform poisoning. The author is in the habit of giving 15 minims (1 gramme) of the tincture of nux vomica about a quarter of an hour before commencing the administration of either ether or chloroform, always taking care that the patient does not take any food for three hours previously. He believes that this practice has been attended by beneficial results. Couper Cripps ² Feb. 27 relates a remarkable case of pneumonia, occurring in a man 42 years of age, in which he believes that life was saved by the administration of hypodermatic injections of strychnine, the drug acting solely as a stimulant to the respiratory centres. The patient had arrived at a period when the Cheyne-Stokes character of the respiration announced an approaching fatal issue. Two cases in which strychnine was successfully employed hypodermatically are reported by Arthur E. Larking, of Chesham, England. ² May 7

One of the cases was of cardiac failure from puerperal septicæmia, and the other one of chronic dipsomania, with symptoms of delirium tremens and cardiac weakness. The most satisfactory results were obtained in both cases. No other untoward effects were produced than a sensation of vertigo and fullness in the head. The dose given was 5 minims (0.30 gramme) of the liquor strychniæ with nitro-hydrochloric acid.

The hypodermatic injection of strychnine in the treatment of inebriety is favored by R. Welsh Branthwaite, of Dalrymple Home, Rickmansworth,² May 14 but the writer does not believe in the vaunted prophylactic properties of the drug in warding off subsequent attacks. C. T. Dercum³⁶² No. 8, '91; ¹⁹ June 18 reports the successful treatment of a patient, who had taken 30 grammes (1 ounce) of the extract of opium, with hypodermatic injections of 0.00375 gramme ($\frac{1}{175}$ grain) of strychnine every hour for seven doses. Prior to using the strychnine, all the usual antidotes and restorative methods were employed unsuccessfully. Gamper⁶ Feb. 20 has published some observations on the action of strychnine. Five of these were made on seven persons, five of whom were enjoying good health, one suffering from gastralgia, with excessive secretion of gastric juice, and the last, the author himself, from gastric catarrh. The observations lasted from twenty to thirty days, and during the first and last week no drug was given to excite the stomach. Ewald's test-breakfast was given, and observations were undertaken to determine the volume of gastric juice, the result of fermentation, the percentage of total acidity, the proportion of hydrochloric acid by weight, the digestive power of the juice, and the absorbent power and movements of the stomach. Nitrate of strychnine was given at breakfast-time, in doses varying from 0.002 gramme to 0.005 gramme ($\frac{1}{32}$ to $\frac{1}{12}$ grain), but sometimes increased to 0.015 gramme ($\frac{1}{4}$ grain). The activity of the stomach was increased in all respects, except in the matter of the ferment and the lactic acid. The author attributes the usefulness of the drug to the increased excitability of the medulla caused by the strychnine.

Opium.—Leubuscher¹¹³ No. 14; ⁶⁹ No. 9 has made a comparative study, in animals and man, of the action of the various alkaloids of opium. Next to morphine, papaverine exerted the most sedative influence upon the movements of the bowels; narcotine was below papaverine in activity; narceine and codeine proved entirely in-

effective; thebaine acted as an intestinal stimulant. The administration of papaverine, in doses of from $\frac{1}{6}$ to $\frac{1}{2}$ grain (0.01 to 0.03 gramme), subcutaneously or by the stomach, to individuals whose bowels had previously acted normally, was followed by no constant results. In some persons transient constipation was induced; in others no apparent influence was exercised upon the bowels. In adults with diarrhœa the results were not more conclusive. In children, however, better results were obtained, even large doses occasioning no disturbance of consciousness, respiration, circulation, or appetite.

The question of antagonism between morphine and atropine has been discussed recently by Sticker,³¹⁹_{Mar.26} who says that in cases of poisoning the antagonism of these drugs cannot be doubted, and the want of general recognition of the fact is due to the few opportunities of observing it. The unpleasant effects of morphine used as a hypnotic may be prevented by the addition of atropine. In some cases morphine produces excitement, and, if it be still necessary to use it, atropine will antagonize this. A subcutaneous injection of morphine lessens considerably the dilatation of the pupil produced by atropine-drops, and an injection of morphine and atropine combined is followed by only slight dilatation of the pupil. Irritation of the skin, sometimes produced by morphine, is prevented by atropine. The diaphoretic effects of morphine are sometimes troublesome; they do not occur if atropine be added. On the other hand, the dryness of the skin produced by atropine is remedied by morphine. One of the effects of morphine sometimes seen, and especially in those suffering from early paralysis of the bladder, as in tabes, is retention of urine; belladonna antagonizes this. Morphine mostly constipates; atropine has the opposite effect, especially in chronic constipation. In biliary and renal colic the two drugs should be combined, as not only is any obstruction to the passage of the stone lessened, but the power of propelling it is increased. In cases of heart disease with engorged pulmonary circulation morphine is badly borne, whereas the addition of a small quantity of atropine does away with any disadvantages.

It is said⁴¹_{No.29} that a solution of morphine (1 in 30) may be kept without change if prepared according to the following formula: potassium hydrochlorate, 1 gramme ($15\frac{1}{2}$ grains); spirit of wine, 5

grammes (77.5 minims); glycerin, 10 grammes (155.5 minims); distilled water, 15 grammes (233 minims); morphine, 1 gramme ($15\frac{1}{2}$ grains). A. L. Saylor, of Haines, Ore., ¹⁸⁶_{Dec., '91} relates the case of a young man who deliberately took 30 grains (1.94 grammes) of morphine at one dose without being the worse for it. Pitts E. Howes, of Roslindale, Mass., ⁵⁴⁷_{Apr.} believes that the sale of morphine should be restricted by law; and that, in the treatment of opium *habitués*, the best results can be obtained by a gradual diminution of the drug. Henry Cayley, of Netley, ⁶_{Apr. 9} believes that the drug, in small quantities, as used by the natives in India, is advantageous in supporting the organism to a certain extent, since it will enable individuals to sustain life and vigor on small amounts of food. The author also considers it beneficial in modifying the action of the malarial poison. He says that in Assam and Eastern Bengal the use of opium is universal, and in Orissa, along the swampy, feverish coast, where malaria is very prevalent, nearly all take opium. From what he saw of the people and the prevalence of malaria, the drug appears to keep the natives alive.

That codeine in large doses has a similar action to that of opium is apparently shown by the following case reported by Mettenheimer ⁶_{June 18}: An elderly woman swallowed four pills of phosphate of codeine, each containing about $\frac{1}{2}$ grain (0.032 gramme). Shortly afterward she vomited; suffered from abdominal pain; felt quite ill; was sleepy, but could not sleep, and had suppression of urine. On examination, the pupils were found contracted, the pulse hard and quick, and the respiration accelerated. No urine was passed until thirty-six hours after the pills were taken, and the abdominal pain, the loss of appetite, and the contracted condition of the pupils lasted for several days. The cough, for which the drug was prescribed, was allayed and did not return for a week. The patient finally recovered from the effects of the drug. The tongue, it may be remarked, remained in a clean condition throughout, which seems to show that the vomiting caused by the drug was due not to a gastric irritation, but to a cerebral influence.

Oroxylum Indicum.—The root of this plant, which belongs to the Bigoniaceæ, is employed externally, in the form of a bath, by Evers ⁸¹_{No. 45, '91}; ⁶⁷³_{Apr.} in the treatment of acute articular rheumatism. The author affirms that, combined with the internal exhibition of opium, the remedy possesses a more energetic diaphoretic action

than ipecacuanha. He also gives it internally, in doses of from 3 to 5 grains (0.19 to 0.32 gramme). He claims that it acts as a tonic and astringent in dysentery.

Oxychinaseptol.—See Diaphtherin.

Oxygen.—Skerrit²_{Feb.6} reports the case of a man, 66 years of age, suffering from chronic bronchitis and emphysema, who was markedly benefited by inhalations of oxygen-gas. The patient was sinking fast, the pulse being weak and the surface dusky. Under the first inhalation of the gas the cyanosis disappeared and the pulse improved wonderfully in tone, the change being marked. It was observed that as soon as the administration of the gas was stopped the cyanosis and failure of the pulse would return, but that these signs would again disappear on the re-administration of the oxygen. Although the patient died subsequently, the author believes that life was certainly prolonged for some hours at least, and that the most extraordinary effect of the oxygen was the removal of the cyanosis. Aubrey Blakiston²_{Feb.6} administered the gas by inhalation in three cases of pneumonia and one of acute bronchitis, all unusually severe, with satisfactory results, which were also obtained in some cases of asthma. In these instances, after half a dozen inhalations, the inspiration became longer, and the patients were less distressed. According to Blakiston, the best results are obtained when the gas is administered warm. He recommends it, combined with electricity and massage, in convalescence from long illnesses. Couper Cripps,²_{Feb.27} also, has for some time advocated the use of oxygen inhalations in the treatment of asthma. He refers to a case of opium poisoning successfully treated with the inhalation of the gas. In this case artificial respiration had been previously maintained for over six hours without, apparently, any permanent benefit to the patient. Gilchrist reports²_{Feb.13} a case of influenza, occurring in a woman of 57 years, which terminated in pneumonia. When fatal results were expected from the disease and collapse was threatened, the administration of strychnine and of inhalations of oxygen produced most remarkable results, and apparently saved the patient's life on two occasions.

Gonzalez Alvarez¹⁰⁵³_{July 20} has employed oxygen successfully in congenital weakness and asphyxia of children, in early scrofulosis, and in anæmia. He refers to a remarkable case of malarial cachexia,

in which the inhalations of oxygen produced very favorable results. The author has used, with asserted success, sprays of oxygenated water in chronic hypertrophic pharyngitis, and even in dry laryngeal catarrhs. At the Liverpool Medical Institution, Carter,^{187 July} after demonstrating the various methods by which oxygen might be manufactured and administered, said that the gas was sometimes strikingly beneficial, especially in such acute respiratory troubles as pneumonia approaching crisis, in which it was necessary to ward off the tendency to asphyxia during a limited period until the morbid process could subside. Yet, even in such cases, the remedy not unfrequently failed. The author related several cases in which the gas had been conspicuously useful. None had come under his observation where it had been harmful, and he thought, therefore, that it was wise always to employ it where asphyxia was urgent, even though it should not always—as it certainly would not—fulfill expectations. Among the diseases likely to be benefited by it he included asthma. The effects of the gas are highly lauded by Junius F. Lynch, of Sanford, Fla.,^{81 Apr.} who believes it to be the reviver *par excellence*. He reports one case of phthisis, accompanied by insomnia, night-sweats, cough, and other troublesome symptoms, greatly relieved by oxygen inhalations; and another of nervous prostration, with nausea, tingling sensations, dyspnoea, etc., in which similarly good results were achieved. He details, also, the case of a young woman, aged 19, who had been epileptic for years, was very anæmic, and suffered from irregular and scanty menstruation. In three weeks after inhalations of oxygen were commenced her improvement was marked. She had gained in weight, and slept and ate better than she had for months, and the epileptic seizures had also ceased. James T. Neech, of Tyldesley, England,^{2 Feb. 20} reports three cases of more or less chronic bronchitis, in which inhalations of oxygen gave relief after all other measures had failed to do good. He regards the gas, therefore, as a therapeutic agent of great value in suitable cases.

George Foy, of Dublin,^{2 Jan. 23} describes an apparatus which he has employed with great success in the administration of oxygen. It consists of a rubber bag, of the capacity of 1 gallon (4 litres), and of two tubes, one of which passes from the nozzle of the oxygen-bottle to the rubber bag; the other, passing from the rubber bag, ends in a vulcanite mouth-piece, which, during use, is placed be-

tween the patient's teeth. The attachments of the bag are made by means of a "three-way" cock. The author remarks that as a cardiac and respiratory stimulant oxygen has no equal; and that it may be employed, besides, as a physiological antidote to the ordinary anæsthetics; and that a condition of cardiac weakness may be said particularly to demand it. A case of pyothorax is related by Finley Ellingwood, of Chicago, ¹⁹²_{Apr} in which such threatening symptoms as cyanosis and cardiac weakness were promptly relieved by inhalations of oxygen. After each inhalation the tonic, stimulant, and invigorating effects of the gas were marvelous.

Ozone.—As a result of a detailed study, both of the normal atmospheric ozone and of artificially-prepared samples of the gas, Sonntag ⁵⁸_{Bd. 8} reaches the conclusion that as a disinfectant it is useless. He found that the atmosphere containing 0.05 per cent. per volume of ozone, when allowed to act upon both the vegetative and spore stage of the bacillus of anthrax, was entirely without power to destroy the vitality of the organism; moreover, even less resistant organisms than the one named could be exposed for twenty-four hours to air containing more than four times the proportion of ozone mentioned without in any way losing their virulent properties. It was not until as high a proportion of ozone as 0.01353 gramme ($\frac{1}{5}$ grain) per litre (quart) was reached that any effect upon the life of the organisms exposed to it could be detected, and this effect appeared with such irregularity as to be of but little importance.

In a paper read before the American Pediatric Society, Augustus Caillé, of New York, ⁹⁹_{May 12} related his experience of the value of ozone in certain forms of diseases of children. He tried nascent ozone in 3 cases of incipient phthisis, 3 of chlorosis, and 5 of pertussis. The author included, also, the results in 3 cases of pertussis and 8 of chlorosis and anæmia treated in the same manner by other physicians. He finally concluded that inhalations of ozone, by means of Labbé and Oudin's apparatus, have not been followed by noticeable evil effects; that daily inhalations of ozone increased the quantity of oxyhæmoglobin in the blood from 1 to 4 per cent. in a short time, and that this increase remained stationary for some time; that in 3 typical cases of limited apical tuberculosis a local improvement was not obtained by inhalations; that in pertussis they had a very marked curative effect,

as regards the duration and severity of the disease; that in chlorosis and anæmia they were exceedingly valuable from a therapeutic stand-point, and gave prompter and better results than any other form of medication known to the writer; that atmospheric disinfection was readily secured by means of the apparatus, making this of value in the treatment of scarlet fever.

Pambotano.—According to Jose Herles,^{673 Feb.} this plant contains fat; wax; an essential oil; two resins; a tannin, giving a black precipitate with the perchloride of iron; another tannin, giving with the same reagent a dark-green precipitate; a glucoside, and salts. It is given in decoction for fever, diseases of the eye, including opacities of the cornea, and leucorrhœa. The drug improves the appetite, cures diarrhœa and dysentery, loosens the bowels, is an expectorant, and is efficient in curing cough. It will be remembered that it was Valude who first called attention to the virtues of this plant through Dujardin-Beaumetz. (See ANNUAL, 1892, vol. v, A-109.)

Papain.—See *Carica Papaya*.

Papoul.—See *Carica Papaya*.

Paracresotic Acid.—E. Egasse,^{67 Jan. 20} writes of the employment by Demme of the paracresotate of sodium in thirty-two cases of diseases of children. The best results were obtained in acute articular rheumatism. It is not a powerful antipyretic, but it does not cause digestive disturbances or congestive phenomena, as does salicylate of sodium. In pneumonia of children the remedy was used in doses of 0.10 gramme ($1\frac{1}{2}$ grains) every two hours, and the course of the disease was shortened. In typhoid fever it diminished the stools, and in gastro-intestinal catarrh it produced effects similar to those obtained by resorcin, without the inconveniences of this latter remedy. Demme gives the following *résumé* of doses: for a child of from 2 to 4 years of age, a maximum single dose of 0.10 to 0.25 gramme ($1\frac{1}{2}$ to $3\frac{4}{5}$ grains), or a daily maximum amount of from 0.50 to 1 gramme ($7\frac{3}{4}$ to $15\frac{1}{2}$ grains); 5 to 10 years, maximum single dose, 0.25 to 1 gramme ($3\frac{4}{5}$ to $15\frac{1}{2}$ grains), or daily amount of 2.50 to 3.50 grammes (38 to 53 grains); 11 to 16 years, single dose of 1 to 1.50 grammes ($15\frac{1}{2}$ to 23 grains), or daily amounts of from 3.50 to 4.50 grammes (53 to 69 grains). For the treatment of gastro-intestinal catarrh in very small children Demme recommends the

following combination: paracresotate of sodium, 0.10 to 0.20 gramme ($1\frac{1}{2}$ to 3 grains); tincture of opium, 2 to 4 drops; cognac, 1 gramme (15 minims); syrup of acacia, 5 grammes (75 minims); distilled water, 25 grammes ($6\frac{1}{4}$ drachms). A teaspoonful of this mixture is given every two hours.

Paraffin.—Karl Rosaer⁹⁹_{Aug. 16} recommends liquid paraffin as a solvent for camphor for subcutaneous injections. On warming, a clear solution is obtained, which will keep for a long time. Two cases in which pulmonary symptoms arose after the injection of mercurial paraffin preparations are related by Blaschko.³⁴_{May 17} In the first case there was cough, with a feeling of oppression and pain in the chest. On the following day hardly any breathing could be heard over the right side, and there was abundant expectoration, streaked with blood. In the second case there was also pain in the side, cough, with expectoration of blood-stained mucus, and some fever. The symptoms disappeared in each case after three days. A third case is also referred to; and it is stated that in some patients violent attacks of coughing come on after the injection. The author would explain these symptoms on the ground that the fluid paraffin with the mercury suspended in it was carried to the lungs and produced embolism as fat does.

Paraldehyde.—J. Cockburn Syson, of Beith, N. B.,⁶_{July} describes at length a case of senile arterial degeneration, with considerable mental depression, restlessness, and marked anæmia, in which good results were obtained from the use of paraldehyde. This drug produced hypnotic effects when sulphonal, urethan, chloral, and other substances had failed completely. It had also a decided diuretic action. As far as his limited experience goes, the author believes that in paraldehyde we have a safe and reliable hypnotic, although its administration is followed by a well-marked stage of excitement; that it does not depress the heart's action, does not interfere with the appetite or digestion, probably possesses diuretic properties, and produces sleep which is described by patients as refreshing. [We believe that this good opinion of paraldehyde is only that commonly held by most physicians who have used it to any extent.—Ed.]

Passiflora Incarnata.—Jos. Adolphus, of Atlanta, Ga.,¹⁹⁹_{Feb.} states that this plant is a sedative to the nerve-centres, and an excellent remedy in cough from whatever origin. He reports two

cases occurring in young persons, and refers to many others in which the medicament produced excellent results when other drugs had failed to relieve the cough. The author employs a saturated tincture of the whole plant, in doses of 10 drops in a tablespoonful of water every two hours.

Pental.—According to Paschkis,^{169 Feb.; Apr.} ¹¹² pental, or beta-iso-amylenol, a new anæsthetic prepared from amylenol hydrate, is a clear, highly-refractive liquid, volatile at ordinary temperatures, and miscible with alcohol, chloroform, and ether, but insoluble in water. It can be administered in the same way as ether. The first effect is that of excitation, then contraction of various muscles, even to opisthotonos in rare cases. The corneal reflexes disappear late, but a stage of analgesia occurs early, which can be made use of for minor operations. Narcosis comes on in one to one and a half minutes, and lasts only so long as the administration is continued. The recovery is pleasant and prompt; a staring countenance, difficulty in speech, and stumbling gait lasting for a few minutes only. Sometimes a slight redness of the face is seen during the narcosis. The author refers to two cases of death produced by the anæsthetic. According to Breuer and Lindner,^{8 Jan. 22; May} ¹¹² the chief action of the drug is that of an anæsthetic, and it may be administered in the ordinary way from a mask, or even from a pocket-handkerchief. The after-effects are said to be slight in most instances, though in some cases dizziness or trembling of the extremities may occur. In two of the cases observed by the authors the patients cried after the operation, but could not give any reason for so doing. Narcosis was generally established in from one to one and a half minutes, and in children sooner than in adults. In the cases reported by the authors the shortest time for the production of narcosis was forty seconds and the longest thirty-one minutes. Alarming symptoms were noticed in one case only. In two, erythema was produced. The pulse was not affected in any unfavorable manner. For slight narcosis, 75 to 150 grains (4.86 to 9.72 grammes) of the anæsthetic were used; in the longest, about 1 ounce (30 grammes). Although no unpleasant effects were produced, the authors believe that, as with chloroform, great caution should be taken in administering it. They conclude, from their clinical observations, that pental, while it will not bring about such deep narcosis as does chloroform, will produce it sufficiently to permit

of major as well as minor operations being performed ; and, further, that the narcosis occurs rapidly, disappears quickly, and is not followed by ill effects.

Hollander^{116 Jan. ; 112 Apr.} believes that for short operations, especially for extracting teeth, pental is much superior to bromoform, ether, or chloroform, and is exceedingly safe. The author, who seems to have had a large experience with the new anæsthetic, emphasizes the entire lack of all disagreeable feelings on awakening. As a result of considerable clinical experience, and of a series of experiments on dogs, Chalab^{259 Jan.} formulates the following conclusions: 1. The anæsthesia produced by pental is very superficial. 2. The time necessary to obtain sufficient anæsthesia for ordinary surgical operations is much longer than with chloroform. 3. Pental has a depressant action on the circulation, and when given in sufficient quantity to produce complete anæsthesia may cause grave results. 4. The local anæsthesia produced by pental is inferior to that produced by ether.

The third conclusion agrees with the results obtained by Wood and Cerna, of Philadelphia, in a recent experimental investigation. (See article on "Experimental Therapeutics," vol. v, B-34.) Weber^{34 Feb. 16} has used pental as an anæsthetic in two hundred cases of minor operations, such as the extracting of teeth, opening of abscesses, etc. He found that it was apparently more pleasant to take than chloroform, and that even a moderate degree of excitement was seldom produced. In two cases, after some excitement, slight tetanic convulsions occurred, but they disappeared as the narcosis proceeded. The patient soon comes out of the narcosis ; and, though at first a little unsteady, soon loses this sensation. No untoward after-effects, such as headache, vomiting, or even malaise, were ever noticed. No definite effect on the pulse or breathing was observed. The corneal reflexes disappeared late, and in some cases the pupils dilated widely. There was no salivation. Occasionally laughing occurs. The author asserts that he was able to extract teeth without pain, the patient being still able to open his mouth on being requested to do so. Even after consciousness is regained there remains some anæsthesia ; enough, according to the author, to allow of the removal of another stump without causing pain.

Permanganate of Potassium.—An interesting study on the

action of permanganate of potassium in rattlesnake poisoning, based on nine successful cases, is published by Amos W. Barber, of Cheyenne, Wyo.⁸⁰_{Jan.} The author recommends the following plan of treatment: 1. Free incisions to the bottom of the wound and immediate cauterization; or, if this is not practicable, sucking of the wound. 2. The immediate application of an intermittent tourniquet,—that is, one which is relaxed for a moment at a time, —so that the poison may gain admission into the circulation in small doses. 3. The free administration of alcohol or of carbonate of ammonium. This might be termed the urgency treatment of snake-bite poisoning. 4. Free incisions into all portions of the inflamed tissues, and the thorough kneading into these incisions of a 15-per-cent. solution of permanganate of potassium. 5. Multiple injections of the same solution into all the inflamed regions, but particularly into the region of the wound. 6. The complete surrounding of all the involved tissues by permanganate-of-potassium injections, placed from half an inch to an inch apart, the needle being driven into the healthy tissue, just beyond the line of demarkation, and its point being carried to the deepest part of the border of the indurated area. 7. The permanganate-of-potassium solution should be used freely in 15-per-cent. strength. Barber has used $1\frac{1}{2}$ drachms (5.83 grammes) of the pure drug in solution, and would not hesitate to use four times that quantity were it necessary, since it seems to exert no deleterious influence, either locally or generally. 8. The involved area should be dressed by means of lint saturated with 15-per-cent. solution of permanganate of potassium. Stimulation should be given according to indications,—that is, the condition of the pulse. Laxatives, diuretics, and diaphoretics should be administered to aid in the elimination of the poison. The diet should be as nutritious as the stomach can digest. Quite recently, Bókai²⁹⁶_{Jan. 24} has recommended the use of the permanganate of potassium, in a $\frac{1}{3}$ -per-cent. solution, in the treatment of phosphorus poisoning. In its presence phosphorus is converted into ortho-phosphoric acid, which is entirely harmless. It was found that dogs poisoned by phosphorus and treated in this manner recovered. The potassium permanganate exercises no deleterious influence on the stomach.

Petroleum.—The treatment of faucial diphtheria by the use of crude petroleum is highly recommended by O. Larcher, of

Paris, ⁵²_{Feb.27} who has employed the remedy in forty-two cases, with only two deaths. Of these fatal cases, one was moribund when first seen, and in the other the parents did not follow the directions properly. The treatment consisted in gargles or in applications by the physician. In all cases there was a rapid disappearance of the false membranes. The swelling of the glands diminished rapidly as the membranes decreased. In only seven instances did paralysis of the soft palate occur. The author formulates the following conclusions: (1) crude petroleum is sufficient to insure cure of faucial diphtheria; (2) its use is free from all serious objections; (3) it does not interfere with the use of other remedies.

Phenacetin.—A. O. Stimson, of Thompson, Pa., ¹⁹_{Nov.21, '91} recommends the use of phenacetin, in the treatment of influenza, in small and frequent doses. The drug does not, according to his experience, cause gastric disturbances; it is prompt and decided in its action, it has no cumulative effects, and it is much safer for children and old people than is opium. The author believes that it does not lock up the secretions, and that it is preferable to opium in the allaying of the muscular pains. Combined with salol, phenacetin has been very serviceable in his hands. Traill Green, of Easton, Pa., ¹¹²_{June} reports two interesting cases of urinary troubles in advanced age in which the ingestion of phenacetin had a decided effect in diminishing the irritability of the bladder. Ten to fifteen grains (0.65 to 0.97 gramme) were sufficient, administered at bed-time, to produce the desired effect.

Phenic Acid.—See Carbolic Acid.

Phenocoll.—This new derivative of phenacetin has been tried by Albertoni ⁵⁸⁹_{Feb.5} in 34 cases of malaria, with a permanent cure in 24, doubtful results in 5, and failure in the other 5. Some of the patients cured had suffered severe relapses after treatment with quinine. To prevent relapses, phenocoll was given in 15-grain (0.97 gramme) doses, in powder, six or seven hours before the expected paroxysms. The medicament has no unpleasant after-effects, and the taste is easily covered by mixing it with sugar, and in this way children take it without difficulty. According to Hermann Eichhorst, ²¹⁴_{Mar.1}; ²⁶_{Apr.1} the therapeutic properties of phenocoll may be summed up as follows: (1) the drug, in the dose of from 0.5 to 1 gramme ($7\frac{3}{4}$ to $15\frac{1}{2}$ grains) for an adult is a very reliable antipyretic, the temperature remain-

ing at the normal level, on an average, from four to six hours after the ingestion of a dose; (2) the remedy, however, produces profuse perspiration, while in some patients a subsequent re-elevation of the temperature is accompanied by intense rigors (in this respect phenocoll is inferior to phenacetin, which never causes disagreeable symptoms of this kind); (3) in cases of typhoid fever phenocoll seems to exercise a favorable influence on the symptoms, the course of the disease becoming milder; (4) as an antirheumatic phenocoll is much inferior to salicylic acid; (5) as an antineuralgic it has no advantages whatever. Rudolph Bum ^{41 99} _{Aug. 8; Sept. 1} gives the following conclusions as the result of his experience: Even in small doses it is a powerful, almost sure antipyretic in the treatment of phthisis; but in case of great weakness and in the last stages of the disease it should not be employed. The remedy has a slighter and much less constant action in erysipelas, even when administered in large amounts. In rheumatism it has only a slight antipyretic action, and does not affect the disorder. In migraine it acts well, but has no effect in myelitis or sciatica. Untoward after-effects occurred in a few cases only, these being seen especially in connection with the digestive tract. The drug was employed (best in wafers) in doses of from 0.5 to 1 gramme ($7\frac{3}{4}$ to $15\frac{1}{2}$ grains), and in daily amounts of 5 grammes ($1\frac{1}{4}$ drachms).

Phenocoll has been tried clinically by P. Cohnheim. ^{116 80} _{Jan.; May} The minimum antipyretic dose was 4 grains (0.26 gramme), the largest single dose employed was 15 grains (0.97 gramme), and the largest quantity given in one day was $67\frac{1}{2}$ grains (4.372 grammes). The results obtained appeared to agree with those of previous investigators, notably Hertel and Herzog. Cohnheim, however, observed a more marked antifebrile action in cases of hectic fever; an average fall in temperature of 2° F. (1.1° C.) following $7\frac{1}{2}$ grains (0.482 gramme) of phenocoll, though twice a fall of 3.5° F. (2° C.) and once of 4° F. (2.2° C.) was observed. The time in which the temperature sank to the minimum varied from three to four hours. Profuse sweating and slight chill upon a subsequent rise of temperature were also noted, as well as the dark urine produced by the larger doses, with its characteristic reaction with chloride of iron. It had no action in hysteria or in other affections in which other antineuralgics and narcotics were

powerless. The author found the drug successful in the treatment of acute rheumatism, but not in chronic articular rheumatism. It did not do good as an antiasthmatic. Balzer¹¹⁶_{June} treated 30 cases with phenocoll. There were no ill effects produced by it, even in doses of from 4 to 6 grammes (1 to 1½ drachms) a day, except in 2 instances, in which it caused some cyanosis, but without threatening symptoms. In doses of 1 gramme (15½ grains) it acted as a prompt antipyretic. It thus gave good results in 15 cases,—7 of enteric fever, 4 of phthisis, 2 of pneumonia, and 1 of erysipelas. In phthisis it produced much sweating, and was, on this account, not useful. It was found valuable as an antirheumatic, and it may take the place of the salicylates when the latter are contra-indicated. In 2 cases of chronic rheumatism the result was negative, and in cases of neuralgia it did not seem to have much effect. It has been proved, according to the author, that the excretion of nitrogen in the urine is increased by phenocoll.

Phenylurethan.—See Euphorin.

Pichi.—O. W. Braymer²⁰²_{Jan. 11} recommends the use of this plant, in the form of the fluid extract, as an aid in the disintegration of calculi, either renal or vesical. The author cites one case of renal colic, and refers to others, in which the drug acted with most satisfactory results.

Pilocarpine.—See Jaborandi.

Piperazin.—Biesenthal and Schmidt²⁶_{Mar.} have recently conducted some valuable experiments with this substance, and refer to four cases in detail, mentioning eleven more, in which the drug produced a more or less complete cure. In the four cases of gout described the disease was of a severe character, in some of them having been inherited. The doses employed were 8 to 15 grains (0.52 to 0.97 gramme) daily, either in the powder form or in that of "gout-water," which consisted of soda-water in which was dissolved 15 grains (0.97 gramme) each of piperazin and phenocoll. The authors recommend a trial of piperazin not only in gout, but also in those cases of rheumatism which are not sharply defined, especially those which partake of the gouty character. For local application they found the following solution beneficial: piperazin, 15 to 30 grains (0.97 to 1.94 grammes); spirit, 5 drachms (18.48 grammes); water, 2½ ounces (75 grammes). This mixture was

applied to the swellings by means of a Preissnitz bandage. According to the studies of Mordhorst,²⁹⁶ ⁶⁷³ _{May 8; July} piperazin has little effect in lessening the acidity of the urine, but causes a marked diminution in the amount of crystalline urates, although the author has never been able to cause their entire disappearance by the use of the remedy. He employed the drug, in doses of 1 to 2 grammes ($15\frac{1}{2}$ to 31 grains) a day, in five cases of gout, but found that it possessed no more energetic powers than the ordinary alkaline waters.

Psoralea Pentaphylla—*Psoruline*.—This drug is chiefly used in Mexico as an excellent antiperiodic. An active principle is said to have been discovered in the plant, by Lozano,⁷⁹² _{Jan.} called *psoruline*, and considered by him to be an alkaloid. Lozano has employed the plant with advantage, especially in the case of children, giving a fluid extract, in doses of from 20 to 40 drops a day; although the drug may also be employed in the form of powder. From the results obtained, the writer concludes that (1) *psoralea* is never toxic, and, when given in large doses, only produces some nausea and vomiting, due probably to a direct irritation of the mucous membrane of the stomach; (2) no such symptoms are observed with the fluid extract, no matter how prolonged the treatment may be; (3) the effects of the drug are more decided when it is employed as a simple febrifuge than when used as an antiperiodic.

Pyoktanin.—See Aniline.

Quinine.—Boutin, of Havre,²⁰³ _{Feb. 15} reports the interesting case of a man, 59 years of age, in whom an exceedingly obstinate nasal hæmorrhage ceased only after the administration of quinine. Ergotin and other measures had been employed without result. The epistaxis was evidently of malarial origin, as 1 gramme ($15\frac{1}{2}$ grains) of quinine was sufficient to arrest the flow promptly; proven by the fact that, on suspension of the drug, the hæmorrhage would return. An interesting case of quinine poisoning is reported by A. Erlenmeyer,²¹² _{Jan.} who had previously observed abolition of the reflexes in patients taking the drug in large doses. In the case under consideration, the symptoms noticed were those of an intense reflex excitability. The patient, aged 42 years, had taken at one dose, 1 gramme ($15\frac{1}{2}$ grains) of the drug; on the following day 2 grammes (31 grains), in divided doses, were taken, and ex-

amination of the patellar reflexes at this time brought on a series of general convulsions, with violent contractions of the arms and the whole body. This nervous excitability would disappear on suspension of the drug for twenty-four hours.

Kazimierz Ciaglinski, of Siedloe, ⁵²⁰_{No. 13} reports the following case of iodiosyncrasy to quinine. A young lady, 22 years of age, dark-haired, pale-faced, moderately well nourished, and a delicately made but generally healthy girl, took 5 grains (0.32 gramme) of the sulphate of quinine at about 5 P.M., in order to relieve an attack of toothache. About 6 P.M. there suddenly developed extreme prostration, agonizing præcardial and peri-umbilical pain, obstinate nausea, repeated vomiting, and diarrhœa with profuse, offensive stools of a black color. At the same time her body and extremities became covered with patches of urticaria. The rash disappeared spontaneously in about one and a half to two hours, but all the other symptoms persisted until the author's arrival, at about 9 P.M. On examination, there was also found a filiform, accelerated pulse (120 per minute), contracted pupils, dry tongue, and extreme tenderness of the abdomen. Under the influence of the internal administration of mild sedatives and a strong infusion of coffee all the symptoms rapidly subsided. An inquiry elicited the fact that, several years previously, the patient had experienced exactly the same train of phenomena after swallowing a quinine powder. She had once suffered obstinate vomiting after a dose of morphine; the smell of strawberries alone would produce the same effect; and the patient's sister contracted urticaria from eating red currants.

Another case of quinine rash is related by Francis J. Shepherd. ²⁸²_{Mar.} A man, 41 years of age, after taking 15 grains (0.97 gramme) of quinine in divided doses, suffered from a rash composed of claret-colored patches. The peripheral portions of the patches were erythematous, and the color disappeared on pressure. The eruption was confined to the abdomen, thighs, hands, and feet, and was accompanied by a great deal of burning and soreness. Desquamation occurred in ten days, the skin of the palms of the hands and soles of the feet, especially, coming away in one piece. Sometime afterward he had occasion to take some mixture containing quinine, and the same series of phenomena was exhibited in his person. In neither of these instances was there any rise of temperature or any other constitutional disturbance.

Resorcin.—Hallopeau ³_{June 11} reports a case of hospital gangrene in a young girl, resulting from ulcerations of the leg, in which applications of resorcin produced excellent results. Salol and phenic acid had failed to arrest the disease. Resorcin, however, was effective in solutions of the strength of 1 in 50. The use of this drug in the acute digestive disturbances of children, where vomiting is obstinate, is favored by Sonnenburg. ⁹⁹_{Aug. 18} The author employed the following mixture: powder of resorcin, 2 to 4 grains (0.13 to 0.26 gramme); infusion of chamomile, 2½ ounces (75 grammes); camphorated tincture of opium, 1 to 2 drops; syrup of orange-peel, ½ ounce (15 grammes). Of this, ½ teaspoonful was administered every hour or two. No toxic effects were produced by these doses, provided the drug was pure. The resorcin appears to control the vomiting only, and not the diarrhœa.

Rest Cure.—An excellent contribution to this subject has been published by Wharton Sinkler, of Philadelphia. ²⁴²_{May} The author, after examining the subject carefully, and detailing a bad case of hystero-epilepsy in which the method produced the best results, adduces evidence to show that the rest cure does good in a variety of nervous disorders, such as hysteria, neurasthenia, locomotor ataxia, spastic paraplegia, neuralgias, neuritis, and mental diseases. The same may be said in regard to chorea, epilepsy, alcoholism, the opium habit, and uterine diseases. Even cases of albuminuria and lithæmia are said to have been benefited by it. A plan suggested and made use of by Weir Mitchell, especially useful in cases of neurasthenia, is referred to as follows: On awaking in the morning the patient is to take a cup of cocoa, after which she is to rest for twenty minutes. She is then to get out of bed and sponge herself with cool water or be sponged by an attendant, after which she is to be rubbed dry with a coarse towel. She is then to dress leisurely, and lie down for twenty minutes before breakfast; after which meal she is to lie down again for an hour, and rest absolutely. Massage should be given at 10 or 11 in the morning, and this be followed by an hour of rest. She then takes a cup of strong soup or, preferably, milk. The patient may then go about and attend to any duties until luncheon; and after this meal rest is also to be taken. During the afternoon the patient may walk or drive and attend to business

matters; but she should not exercise more than she can possibly help. If electricity be used, it is best given just before the evening meal, or at bed-time. The fluid extract of malt may be taken with advantage before each meal. The rest after meals is an important feature, and the patient should retire to bed at an early hour.

L. J. Belknap, of Alma, Mich., ²⁰²_{July 25} combines the Weir Mitchell method with the application of fomentations to the stomach and liver, particularly in cases of dyspepsia, and claims to have obtained excellent results.

Retinol.—E. Desnos ³⁵_{June} recommends the use of salolated retinol, of the strength of 6 per cent., in the treatment of certain forms of cystitis. It may be employed in all the varieties, such as tubercular, blennorrhagic, and others; but acute cystitis is the least benefited by it, owing to the fact that the remedy is so soon eliminated. In hæmaturia the medicament exercises no hæmostatic action, but in the subacute forms of cystitis in general its employment lessens the symptoms and diminishes the amount of pus in the urine, as well as the pain and frequency of micturition. Desnos advises a preliminary washing of the bladder with boric acid and the injection of from 5 to 30 grammes ($1\frac{1}{4}$ to $7\frac{3}{4}$ drachms) of retinol.

Rhus Toxicodendron.—After considerable experience, C. L. Gregory, of Yreka, Cal., ⁷¹_{Aug.} believes that the drug produces good results in the treatment of sciatica and rheumatic affections, especially in those cases in which there is more pain in beginning motion. J. Lindsay Porteous, of Yonkers, N. Y., ⁷¹_{Aug.} reports a case of rheumatic neuralgia, in which the remedy caused the disappearance of the pain before many doses were administered. Arthur Devoe, of Seattle, Wash., ¹⁷⁶_{Mar.} has found rhus of value in the treatment of acute rheumatism complicated with endocarditis. Rhus has been employed with success, in the treatment of skin diseases, by George Kirkpatrick, of La Harpe, Ill. ⁷¹_{Aug.} He reports excellent results in a case of psoriasis occurring in a lady, 50 years of age, to whom he gave 5 to 10 drops of a saturated tincture three times a day, and ordered an external wash containing a small quantity of oil of wintergreen. In cases of poisoning by this plant, Thos. J. Exton, of Armstrong, Ill., ¹⁹²_{June} recommends some one of the following prescriptions to be applied after opening of the bowels: 1.

Muriate of ammonia, 2 drachms (7.78 grammes); water, sufficient quantity to make 4 ounces (118 grammes). Apply freely several times a day. 2. Oil of sassafras, boroglyceride, equal parts. With this mixture the parts affected are freely painted three or four times a day. 3. Acetate of lead, 2 drachms (7.78 grammes); tincture of opium, 1 ounce (29.57 grammes); water, sufficient quantity to make 8 ounces (236.56 grammes). Apply this mixture freely three or more times a day. 4. Fluid extract of grindelia, $\frac{1}{2}$ to 1 ounce (14.79 to 29.57 grammes); water, a sufficient quantity to make 4 ounces (118 grammes). Apply by means of cloths.

Salicylate of Sodium and Theobromine.—See Diuretin.

Salicylic Acid and Salicylates.—The solubility of salicylic acid can be increased, it is stated, ⁶_{Mar.5} by the addition of 1 part of the acid to 100 parts of glycerin and 150 parts of water. This mixture is stable and miscible with water, making a clear solution. In the treatment of the chronic suppuration of middle-ear disease, Kent O. Foltz ¹⁹²_{Dec., '91} highly recommends salicylic acid locally applied. He reports a case in which he obtained the most satisfactory results after other measures had been employed in vain. Foltz uses the following powder: salicylic acid, 1 drachm (3.89 grammes); boric acid, 6 drachms (23.33 grammes). To be introduced by insufflation. Geo. H. Treadgold, of Port Huron, Mich., ¹⁸⁶_{July} has administered salicylate of soda internally in six cases of chronic eczema. The remedy effected a cure after other medicaments had been of no avail. Treadgold affirms that the salicylate acts by relieving the hyperæmic condition of the skin. From a study of the salicylates of bismuth and of lithium, Schlumberger ⁶⁷_{Apr.15} believes that, locally applied, the former is the superior drug, and produces excellent results by acting at the same time as an absorbent and a disinfectant; while the therapeutic applications of the lithium salt can never become as generalized as those of the bismuth preparation. The salicylate of bismuth should be employed in those affections for which the lithium salt is administered. The author believes that, in the preparation of the saline medicaments, the acids of the aromatic series—such as salicylic acid—should be substituted for the classical mineral acids.

Von Ackeren ¹⁷_{June 28} considers both salicylic acid and salicylate of sodium irritant, and reports several cases in which all phenom-

ena of irritation disappeared on the suspension of the drugs. The action was chiefly manifested by the kidneys. The substances were given to rabbits, in sufficiently large amounts, and in these animals death was produced by an acute nephritis. In one of the animals to which the drugs were administered internally, hæmorrhages of the mucous membrane of the stomach and the upper part of the intestine were found post-mortem. In another, ulcers were met with in the stomach. In a third animal ulceration of the bladder was observed. Similar phenomena, the author affirms, are met with in patients subjected to treatment with the salicylates.

Salipyrin.—This drug has been found of much value by Argo¹¹⁶_{May} in several cases of severe hemicrania, in cases of headache after alcoholic excess, in two cases of chronic rheumatism, and in one of chronic gout. It has also rendered good service in influenza. It possesses properties which make it superior often either to salicylic acid or to antipyrin. The author employs doses of 1 gramme ($15\frac{1}{2}$ grains), the total daily amount being 3 grammes (46 grains). Salipyrin has also been studied by our corresponding editor, Moncorvo, of Rio Janeiro,⁶⁷³_{Oct.} who administered the remedy to children in daily doses of 3 to 4 grammes (46 to 62 grains), giving a first dose of 2 grammes (31 grains), and following it with hourly doses of 0.25 to 0.50 gramme ($3\frac{7}{8}$ to $7\frac{3}{4}$ grains). The antithermic power of salipyrin was found to be much inferior to that of antipyrin in proportional doses, the defervescence obtained by means of it being relatively shorter in duration. In several cases of acute articular rheumatism the action of salipyrin was inferior to that of antipyrin. It was, however, well tolerated by children.

Salol.—This substance has given, according to the observations of Loewenthal,⁶⁹_{Aug.11} ⁹⁹_{Sept.1} most remarkable results in the treatment of Asiatic cholera. The remedy was administered in a single dose of 2 grammes (31 grains), followed by the hourly or half-hourly ingestion of from $\frac{1}{2}$ to 1 gramme ($7\frac{3}{4}$ to $15\frac{1}{2}$ grains). The same favorable results in the treatment of Asiatic cholera with salol were obtained by Gonzales⁶⁹_{Aug.11} ⁹⁹_{Sept.1} in one of the Philippine Islands. In 53 cases there were only 3 deaths, and these fatal cases were already in the last stages of the malady when first seen. Robert C. Kenner, of Louisville, Ky.,¹⁰⁵⁴_{Mar.} favors salol as

an excellent antiseptic in the treatment of intestinal disorders. He relates several cases with tympanites as the prominent symptom, in which the drug produced good results. The author has also successfully treated with salol cases of intestinal catarrh in children, and describes an instance of tonsillitis that likewise yielded to this treatment. He administers the remedy in doses of from 1 to 10 grains (0.065 to 0.65 gramme) every two or three hours, according to the exigencies of the individual case.

B. Arnold, of Stuttgart, ⁷⁶⁰_{July 16} has employed salol in the treatment of acute and chronic cystitis, and, from the results obtained, draws the following conclusions: 1. Salol makes alkaline urine acid. 2. It removes the foul odor. 3. It clears cloudy urine, the muco-purulent sediment diminishing, becoming lighter and flocculent, finally disappearing entirely. 4. The amount of urine is generally increased. 5. The stomach retains the remedy very well and for a considerable time, which makes salol superior to other drugs employed in cystitis. This property is probably due to the fact that it is insoluble in the gastric juice, and becomes dissolved and decomposed only after it reaches the intestinal and the pancreatic secretions. 6. It is an excellent adjunct in washes for the bladder, especially when only weak antiseptic solutions are borne. Arnold does not claim that salol is a panacea, but that it is an excellent remedy in acute and chronic cystitis.

Before the Society of Laryngology, Otology, and Rhinology of Paris, Cartaz ¹¹_{Jan.} described two cases of eczematous erythema consequent upon applications of salol. The first one was that of an arthritic patient with chronic pharyngitis and obstruction of the right side of the nose from turbinated hypertrophy. The obstruction was removed by the cauterization, and insufflations of salol twice a day were prescribed. On the third day the onset of erysipelas was feared by the patient, and the author found an erythema, with swelling and irritation in the nose, and an eruption of vesicles having all the characters of eczema. Though the irritation was allayed by starch poultices, the next day it had extended, the patient having continued his salol insufflations. When these were discontinued, the eczematous attack declined within forty-eight hours. In the second case, a pseudomembranous eruption developed on the ala of the nose and upper lip on the second day after using salol insufflations, after cauterization of the inferior

turbinated body. The eruption declined on discontinuing the salol, but re-appeared when, eight days after, the patient had resumed its use, to again disappear on discontinuing the insufflation. In another case, application of salol in vaselin (1 to 10) to the nose, for rhinitis and ulceration, was followed by intense irritation, which quickly disappeared on substituting aristol for the salol, and applying starch in powder and poultices.

Salophen.—This new drug is a derivative of salicylic acid, and contains about 50 per cent. of the latter substance.⁶_{Mar.5} It is prepared by treating paranitrophenol with salicylic acid, then reducing the nitrophenol by means of zinc and hydrochloric acid, and acting upon this with acetic acid. Salophen is insoluble in cold water, and only slightly so when warmed. It is soluble in alkaline solutions. Alcohol and ether dissolve it readily. It burns with a smoky flame. Taken into the stomach, it is broken up into salicylic acid and acetyl-para-amido-phenol. According to Guttmann, the chief virtues of salophen lie in its action in articular rheumatism. It may be given in daily doses of from 4 to 6 grammes (1 to 1½ drachms), in compressed tablets or in pill form.

According to Siebel,¹¹⁶_{Jan.} salophen hinders decomposition when given in a quantity sufficient to provide enough salicylic acid. The new drug is tasteless and odorless, and has feeble toxic properties. In any case, only the symptoms of salicylic-acid poisoning would be produced, for the other constituent is without toxic action. Fröhlich,⁸⁴_{July 9} obtained satisfactory results in all of the thirty cases of acute rheumatism in which he employed salophen. The pain ceased in from three to four days, and the acute swelling disappeared in from six to eight days. The medicament, however, did not influence large articular effusions, and, like other salicylic-acid preparations, did not prevent relapses. In two cases acute endocarditis appeared during the treatment. Salophen is to be preferred to the salicylates, because (1), being decomposed in the intestines, it does not irritate the stomach; (2) it can be given in large doses, and for a long period, without unpleasant effects; and (3) it is tasteless. In chronic rheumatism it is not nearly so efficient. Out of six cases only two were improved. Salophen has very little action as an antipyretic. In one out of three cases of cystitis it seemed to be

useful. In only three cases were there any unpleasant effects produced, and these were slight.

Santonin.—D. H. Bergy, of North Wales, Pa., ⁷¹_{July} reports the case of a woman, 36 years old, in whom uterine colic, due to suppression of the menses, was relieved by the administration of santonin. He has used this drug in other similar cases, and always with the same good results. It acts as an emmenagogue by relaxing the engorged uterus. It should be administered in a dose of 10 grains (0.65 gramme), to be taken at night at the first approach of the menstrual molimen. In this manner, it is asserted, the suffering has been warded off and the menstruation established without any other disturbance.

Sarsaparilla.—Three active principles have recently been isolated from this drug, namely: *parillin*, *sarsaponin*, and *sarsaparillsaponin*,—all apparently of a glucosidal nature. Kobert and Schultz, ²⁶_{July} who have carried on these investigations, believe that the three bodies are allied to each other, and belong to a homologous series of hydrocarbons, possessing identical physiological properties. When given per rectum, they produce only such effects as nausea, increased flow of saliva, and diarrhœa. Subcutaneously administered, they cause abscesses, and eventually death of the animals experimented upon, if given in sufficiently large doses. Injected intra-venously, even in small quantities, all three substances act as cardiac, nerve, and muscle poisons, and produce hæmoglobinuria. The substances are eliminated by the stomach and the intestines.

Sclerotinic Acid.—See Ergot.

Silver.—Two well-marked cases of argyria from the local use of silver nitrate are reported by Hutchinson. ⁹⁶_{Apr.} In both cases the history showed that the drug had not been given internally, and yet the characteristic color of the skin demonstrated the existence of typical argyria. In the first instance the silver had been applied to the mouth and throat, the discoloration of the skin coming on eight years afterward. In the other, the drug was also applied locally to syphilitic sores. This patient believed that his general health had improved since the application of the nitrate of silver had been discontinued. T. Robinson ²_{Apr. 9} reported a case of argyria occurring in a woman. She had taken silver for some uterine ailment during a period of about a year, and then, after

four years elapsed, again employed the drug for a similar affection. She had taken in all 340 grains (22 grammes) of the nitrate of silver. The discoloration only became marked after the second administration, and was confined almost entirely to the face. The conjunctiva was also slightly tinged. There was no blue line upon the gums.

Sodio-Salicylate of Theobromine.—See Diuretin.

Sodium Borate.—See Borate of Sodium.

Sodium Paracresotate.—See Paracresotic Acid.

Sodium Salicylate.—See Salicylic Acid.

Sodium Chloride.—George Covert¹⁹²_{Jan.} says that common salt is a local anæsthetic, being of great service in neuralgia, rheumatism, and painful joints and muscles. He further claims, among other uses for it, that, in combination with treacle, it constitutes the best application for chilblains. A case of collapse from diarrhœa and vomiting, occurring in the Hospital for Sick Children, at Great Ormond Street, London, is reported⁶_{Jan.9} to have been saved by the intra-venous injection of salt solution. The patient, 9 months old, was on the verge of death. Under such conditions the jugular vein was exposed, and into it were injected slowly, with a double-nozzled syringe, 12 ounces (360 grammes) of distilled water, containing 36 grains (2.33 grammes) of common salt and a little more than a drachm of brandy, the temperature of the solution being kept at 101° F. (38.3 C.). The reaction was prompt, and the child made a final recovery. R. J. Pye-Smith²_{Nov.28} reported a case successfully treated by intra-venous injections of saline fluid for hæmorrhage. A man, aged 26, was admitted to the Sheffield Public Hospital, having been accidentally shot in the left leg three hours previously. He had large lacerated wounds, with compound fracture of the tibia and fibula. He had bled profusely, and, when admitted, was much collapsed. A pint and a half ($\frac{3}{4}$ litre) of $\frac{3}{4}$ -per-cent. saline solution was injected into the saphenous vein with marked improvement, and amputation was performed just below the knee. The circulation failing again, another pint and a half was injected before he recovered from the ether, and at once his pulse and color were greatly improved, and in a few hours he completely rallied and subsequently made a good and rapid recovery.

Sodium-Thiophen Sulphonate.—See Thiophen.

Somnal.—O. M. Myers, of New York, ⁵⁹_{Mar.12} has made an interesting clinical study of the therapeutic properties of somnal. He speaks very highly of its hypnotic action, and reaches the following conclusions: 1. It is non-irritant to the gastric mucous membrane, but exerts a stimulating effect on it, producing increased secretion. Locally applied, it acts on the frog's heart as a powerful paralyzing poison. 2. In therapeutic doses it produces no appreciable action on the heart. Toxic doses depress that organ (*a*) by direct action on the heart-muscle; (*b*) by stimulating the cardio-inhibitory centre. 3. Therapeutic doses do not affect the pulse-rate, and produce only a very slight transitory rise of arterial tension. Toxic doses rapidly reduce both pulse-rate and blood-pressure. 4. Ordinary doses produce a slow, full respiration. Toxic doses make the respiration rapid, shallow, and irregular. 5. Sleep is produced by therapeutic doses, without perceptibly affecting any other part of the system; somnal would therefore seem to act directly and primarily upon the cerebrum. 6. Somnal is particularly valuable in sleeplessness mainly of nervous origin, and in that occurring during convalescence from acute disease. It is less reliable in the insomnia dependent on pain or syphilitic disease, and has apparently no influence over that due to acute inflammatory conditions. In whooping-cough, asthma, nervous cough, and chorea, however, it possesses decided sedative properties.

Sparja.—See Asparagus Officinalis.

Spermin.—See Animal Extracts.

Strontium.—Since Vulpian ⁶⁷_{Nov.30,'91} first called attention to the "remarkable therapeutic properties" of the salts of strontium these agents have become quite popular, especially among French physicians, and have been employed extensively in the treatment of disease. The work done so far in this direction is carefully reviewed by E. Egasse. We also refer our readers to the article in last year's ANNUAL (vol. v, A-132.)

Laborde ¹⁰⁸_{May 1} recommends the use of the salts of strontium in the treatment of tænia, in the following solution: lactate of strontium, 20 parts; water, sufficient quantity to make 120 parts. Of this, he gives $\frac{1}{2}$ ounce (15 grammes) every morning for five days. He claims that this treatment is nearly always successful. The recent researches of Féré, ³_{pp.424,468,'91} in his wide field of clinical

observation amongst the mental cases at the Bicêtre Hospital, have led him to the conclusion that the bromide of strontium can, in very many cases, be substituted with advantage, for the bromide of potassium in the treatment of epilepsy. He found that when the bromide of potassium was badly borne in doses large enough to be efficient, as often happens from one reason or another, the bromide of strontium was readily tolerated, produced no toxic effects, and was followed by results equal, if not superior, to those obtained by the former salt. At a recent meeting of the Société de Thérapeutique, Laborde³_{Dec. 9, '91} confirmed the statements of Féré, and endeavored to impress on his listeners the necessity of administering pure preparations only and of avoiding unstable compounds of strontium, such as the iodide, the action of which had not yet been determined by experimental pharmacology. In an experimental and clinical study made with the salts of strontium, Harry L. Clayton, of Philadelphia,⁷⁶⁰_{June 4} reached the following conclusions: (1) the purity of the medicament may be considered to be an absolute *sine qua non* for therapeutic efficiency; (2) it is perfectly innocuous; (3) it has a beneficial action in cases of dyspepsia, especially in those associated with hyperacidity or flatulence; (4) it possesses no irritative action on the stomach, but aids digestion and stimulates the appetite; (5) it is a perfect substitute for the bromide of potassium, and, should therefore, supplant it in the treatment of epilepsy; (6) it is advantageous in the treatment of albuminuria, diabetes of hepatic origin, and the various forms of nephritis; (7) it may be employed as a succedaneum for all the alkaline bromides, having an elective action as an antiseptic, antifermentative, and antiparasiticial agent on the entire gastro-intestinal tract,—properties which have been improperly claimed for several drugs. Naphthol, the salicylates, sulphite of soda, etc., will sometimes act in certain cases, if given in sufficiently large doses, but they are unreliable, often toxic, and always irritating in the end, and their continued use is impossible; while the strontium preparations never irritate, even in large doses. Finally, its anthelmintic action claims attention. That it possesses this property to a remarkable degree cannot be questioned, as, he maintains, the results of his experiments have shown. The author says that the salts of strontium will undoubtedly have other uses on lines of treatment to which he has made no refer-

ence, for it affords a broad field for investigation and research, but that the few indications he has mentioned justify the statement that the drug cannot but obtain a high place in modern therapeutics.

Strychnine.—See *Nux Vomica*.

Sub-gallate of Bismuth.—See *Dermatol*.

Succinate of Iron.—See *Iron*.

Succinimide of Mercury.—See *Mercury*.

Sulphaminol.—Moncorvo, of Rio Janeiro, ⁶⁷³_{Oct.} corresponding editor, has tried this drug in children, as suggested by Kobert. Some authors prefer it to iodoform, on account of the absence of all odor, but Moncorvo does not believe that iodoform should be given a second place. The decomposition of sulphaminol into sulphur and carbolic acid deters us from using the remedy in very young subjects. For these latter the author believes that thiol should be preferred.

Sulphonal.—One of the best contributions published during the last year on sulphonal as a sedative and hypnotic is that of Carlyle Johnstone. ^{166 112}_{Jan.: Apr.} The author divides the subject into three parts, as follows: (1) the effects produced by single doses; (2) those produced by doses repeated at intervals of forty-eight hours; (3) those following doses repeated at intervals of twenty-four hours, or more frequently. The mental condition of all the patients was impaired. 1. Fifty cases were treated with single doses. Between 30 and 40 grains (1.94 and 2.59 grammes) were found to be the most suitable average dose. The interval between the administration of the drug and the occurrence of sleep averaged about three hours. No excitement occurred before sleep. The average duration of sleep was seven hours, and, in the majority of cases, was tranquil and natural. As a rule, the patients awoke feeling refreshed; but in about one-fourth of the cases there was a tendency to sleep during the succeeding day. In 80 per cent. of the cases the action seemed to last through the second night. The effect on the various functions was invariably negative. 2. Doses repeated every forty-eight hours. By the prolonged use of sulphonal the hypnotic action became gradually more pronounced, and went on slowly increasing as long as administration was continued. Drowsiness during the day was increased in this way, and, as a rule, there was an improved condition of the patient. It was

never necessary to increase the dose. The effect on the various functions of the body was apparently negative, as it was in single doses. 3. Doses repeated every twenty-four hours. The average dose given was about 15 grains (0.97 gramme). After a few days' use the patient generally slept better, the hypnotic action becoming more pronounced the longer the administration was continued. Continued doses almost invariably produced a sedative and soothing effect. Within a few days the patients generally became much quieter. If sulphonal was given still longer, the patients became sleepy, slothful, were mentally sluggish, and, finally, only desired to be allowed to sleep. There were no disagreeable dreams. Occasionally the stupefying action came on suddenly, and it was necessary to watch the cases carefully. There were motor symptoms in all cases, ranging from mere feelings of fatigue to complete muscular collapse, but there was a great difference in individual patients. There was very little effect upon the functions of the body. The author concludes that sulphonal is an efficient hypnotic, is fairly certain and constant, and produces sleep which is natural and tranquil. It has no injurious effects on the circulation, respiration, appetite, digestion, temperature, or general health. It has a distinct sedative influence on mental excitement. Its chief disadvantages are the slowness of its action, and the tendency of this action to be prolonged into the succeeding day, and the serious cerebral and motor disturbances which are apt to follow repeated doses. A. O. Simpson, of Thompson, Pa., ¹⁹_{Nov. 21, '91} has induced sleep with sulphonal in fevers where there is a tendency to overexcitation of the brain, but with no tendency to delirium. He believes that doses of from 3 to 5 grains (0.19 to 0.32 gramme) give better results than larger ones.

According to M. Fürst, ^{57: 202}_{Apr. 11} sulphonal is eliminated in the urine, which will contain traces of albumen and of renal elements and a small quantity of unmodified sulphonal; the greatest part of the drug being eliminated in the form of soluble sulphates. The administration of the drug must be suspended when coloration of the urine is observed and the presence of hæmatoporphyrin becomes suspected. In reporting four cases in which sulphonal was given, either continuously or in large doses, S. Grover Burnett, of Kansas City, Mo., ⁵⁹_{Apr. 9} calls attention to the loss of reflexes after such large amounts. The author states that there is unquestion-

ably a close connection between this loss of reflex and the inco-ordination, for in no case has he seen any change in the reflex until after symptoms of inco-ordination were manifest. A case is described by J. B. Marvin,^{19 July 9; 99 Aug. 18} in which death occurred after the ingestion of 240 grains (15.56 grammes) of sulphonal in five doses, two being taken in the afternoon and three the next morning. On the following evening the patient was sleeping heavily; pulse under 100; respiration, 32. When attempts were made to rouse him, he would yawn and turn over. The next morning his sleep was more profound; the respiration more rapid; the pulse faster and weaker; both pupils reacted to light; there was no paralysis; the secretion of urine was abundant. The treatment consisted of hypodermatic injections of nitro-glycerin.

John H. Grant, of Plattsburg Barracks, N. Y.,^{99 Feb. 4} relates two cases in which untoward symptoms were produced by the drug. Both patients had been suffering from epidemic influenza, the most annoying symptom being sleeplessness. The drug in both cases produced no refreshing sleep, but, on the contrary, prostration and general weakness, and a rapid, weak, and compressible pulse. Sulphonal, therefore, is not destitute of noxious properties, and the author believes that it is contra-indicated in all cases of weakening of the vital forces. The dose given in each instance was 20 grains (1.3 grammes). The following interesting case is ascribed by Reinfuss^{650 Jan. 7} to sulphonal poisoning. The patient was a woman 47 years of age, but appearing older, of medium size, strong frame, and healthy lungs and heart. She had suffered for more than a year with hallucinatory insanity, and had received, for stubborn sleeplessness and unrest, from 15 to 22 grains (0.97 to 1.43 grammes) of sulphonal in solution almost daily, from the 28th of May to the 25th of August, inclusive. She had taken altogether 22½ drachms (87.49 grammes) of this remedy. Without premonitory symptoms, as far as recorded, she vomited small quantities of a greenish, slimy fluid three times during August 25th, moaned, and complained of her stomach and bowels. The urine passed showed, for the first time, a characteristic, dark, pomegranate-brown color and a marked deficiency in quantity. It contained no albumen, but a good deal of indican. The patient was free from fever, and a careful examination showed nothing abnormal in the abdomen, lungs, or heart. She no longer left the bed,

nominally on account of a painful feeling of weakness in the bowels and a numbness of the legs. Touch, locality, and temperature perceptions were alike preserved. Vomiting was controlled by minute doses of morphine, with ice, but during the days following she still complained of pains in the belly. She could move her legs in bed, but with difficulty. Attempts to stand and to walk were entirely unsuccessful. The color of the urine and its scanty quantity still persisted. Chemical and microscopical examination showed that the dark color arose from the presence of hæmatoporphyrin. Distinct traces of albumen and renal elements were also found. On August 30th there were two attacks of tonic and clonic spasms of an intensity varying in different groups of muscles, with unconsciousness lasting from five to eight minutes. The urine, somewhat paler that day, was the next morning again of an intensely-dark, pomegranate color. The spasms were not repeated on the following days, but pain in the belly and a feeling of great weariness persisted. The patellar tendon reflexes were somewhat diminished; sensibility of the skin was preserved; the lower extremities were noticeably cool. On September 6th the pulse was 99; senses much clouded; speech low and jerking; tongue dry and rough; thirst increased; stools and urine passed involuntarily in bed. The urine had still the dark, reddish-brown color. There was no appearance of paralysis in the region of the nerves of sight and no exanthema anywhere. The pulse gradually grew weaker and more rapid, the respiration also rapid, the temperature somewhat elevated, thirst persisted, and the color of the urine was unchanged and the amount scanty. Moist râles developed in both lungs. There was profuse perspiration, the mind remained clouded, and the patient died on the night of September 8th.

Taifushi.—See *Gynocardia Odorata*.

Tannate of Mercury.—See *Mercury*.

Tasi or *Tasis*.—See *Morrenia Brachystephana*.

Tetronal.—See *Trional*.

Teucrium Scordium.—The powder of the leaves of this plant has been employed in practical medicine in doses of 0.50 gramme ($7\frac{3}{4}$ grains) three times a day, given half an hour after meals. It may be mixed with a little water. The taste of the medicament is decidedly pepperish. Lebel²¹_{July 21} has used the drug in the itching

of hæmorrhoids. John Brinton has also recently recommended it in hæmorrhoidal pruritus. It produces no disturbances of the stomach, stimulates appetite, calms the nervous irritation, and causes the itching at the anus to disappear. Chéron has employed the remedy successfully against vulvar pruritus.

Thilanin.—This substance, first obtained by Siebel by the interaction of sulphur and lanolin, contains a constant proportion of 3 per cent. of sulphur. It is again described by Saalfeld, of Berlin,¹¹⁶_{No. 11, '91} who has employed it in certain forms of eczema, with apparent benefit in a number of cases. The author believes that thilanin is indicated in dermatoses, and that, as a remedy for these, it is vastly superior to unguentum Hebræ. Three cases of acute eczema of the face and 1 of eczema of the fingers were completely cured in a few days. In a much infiltrated eczema of the face, in an old lady, an improvement, though not a cure, was effected. A case of subacute eczema of the face, 2 cases of rhagadiniform eczema of the scrotum and penis, and 3 cases of chronic eczema were all completely cured within a short time. The same results were observed in 3 cases of herpes zoster. The drug was also valuable in the treatment of sycosis vulgaris, especially of the upper lip. One of these latter had resisted all other remedies tried.

Thiol.—This new antiseptic agent has been employed by Moncorvo, of Rio Janeiro,⁶⁷³_{Oct.} in more than 100 infantile cases, for the purpose of diminishing suppuration and for the removal of cutaneous growths, either parasitic (tinea tonsurans, favus, pityriasis, etc.) or dependent upon general dyscrasie (tuberculosis, syphilis, etc.). Thiol may be used with equal efficiency as a powder, or rubbed up in vaselin (5 to 10 per cent.), or in the liquid form, pure, or diluted with boiled sterilized water. The topical use of thiol was never followed by the least untoward effect, either locally or generally. The therapeutic action was satisfactory in every case. It was used without fear or danger on the youngest children. The author has also used thiol with great success in the treatment of erysipelas and lymphangitis.

Thiophen.—According to Edward Spiegler,¹¹⁶_{Feb.} this substance, which has recently been brought into notice as a remedial agent, is a benzol product, a sulphur-holding hydrocarbon of the aromatic series. It occurs as a colorless, clear, volatile oil, insoluble in

water. It boils at 283° F. (139.44° C.) and has a slight odor. The drug has been used only in the form of *thiophen-sodium sulphate* and *thiophen iodide*. The former appears in the form of a white powder and contains 33 per cent. of sulphur. It has a slightly unpleasant odor, but this is almost imperceptible in the 5- or 10-per-cent. salves which are used in the treatment of disease. With equal parts of lanolin and vaselin this salve has been employed in prurigo. The author treated about thirty cases, the results being, in all of them, quite satisfactory. Cures were effected in about a week. The 10-per-cent. salve healed more quickly than the 5-per-cent. The drug can be used freely, as it does not do any harm. The *thiophen-sulphate of lead* was also used, and caused a slight burning sensation, which lasted for a few moments. The *thiophen iodide* was employed to replace iodoform, and gave great satisfaction. It has a characteristic, but not unpleasant, odor. It crystallizes in beautiful tablets, insoluble in water, but easily soluble in ether, chloroform, and warm alcohol; less soluble in cold alcohol. It contains 75.5 per cent. of iodine combined with carbon, and 9.5 per cent. of sulphur, which is also combined with carbon. This combination was proved by experiment to possess bactericidal powers. It was used in the treatment of wounds with perfectly satisfactory results. In the shape of a 10- to 20- or 30-per-cent. gauze, it was also employed in the treatment of burns, and the results showed that the drug was superior to iodoform. No untoward effects were observed. Hoche²⁹³_{July} has also recommended this substance in the form of gauze as a succedaneum of iodoform.

Thiophen-α-Sulphonic Acid.—See Thiophen.

Thiophen Bi-iodide.—See Thiophen.

Thymacetin.—F. Jolly, of Berlin, ²⁹⁶_{Jan. 8;} ⁶⁷³_{Apr.} has tried this drug in the treatment of nervous and mental diseases, and has found that it possesses incontestable analgesic and hypnotic properties. It calms certain nervous headaches, although it does not seem to influence true migraine. Its hypnotic action is inconstant, since in 26 patients, comprising paralytics, delirious subjects, etc., it failed to produce sleep in 10, while in the other 16 its hypnotic action was very decided. In the successful instances it proved as effective as chloral. In therapeutic doses thymacetin exerts no toxic action, but in larger amounts it produces considerable congestion, accom-

panied by a throbbing sensation and tinnitus aurium. The doses employed by Jolly varied from 0.25 to 1 gramme (4 to 15½ grains); 0.50 gramme (7¾ grains) was a sufficient quantity to produce sleep, when the drug was of any value for this purpose.

Thymol.—Blum, ²⁶⁶_{Apr.} following the example of Bohland, has made five observations in regard to the elimination of thymol, and especially in regard to the action of the drug on the urine when administered in large doses. He found that in all five cases the urine was constantly acid and charged with large amounts of uric-acid crystals, while in three cases diarrhœa was produced. A substance was found similar to that met with in the urine of persons who have been using phenic acid. In a sixth case there were found in the urine thymohydrochinone, thymol in the pure state, and an acid the nature of which was not ascertained.

Trichloroacetic Acid.—The use of this substance, which had apparently been falling off of late, has been revived by Lanz, of Berlin, ²⁶_{Mar.} who has found, as the result of an extended trial of the drug, that a 20-per-cent. solution in water causes less irritation than a solution of nitrate of silver of the same strength, and that this was especially noticeable when it was applied with an endoscope as a local caustic in some cases of gonorrhœa. The acid has given most satisfactory results in the treatment of birth-marks and pigment-spots. The remedy was also found valuable in the destruction of papillomata of the skin.

Trifolium Compound.—This preparation has been used with excellent results by W. A. Walling ²³⁴_{Jan.} in the treatment of scrofula and syphilis. He reports several cases in which it acted successfully after mercury, and even iodide of potassium, had failed. Its composition is as follows: red clover, 32 grains (2.07 grammes); stillingia, 16 grains (1.04 grammes); burdock-root, 16 grains (1.04 grammes); prickly-ash bark, 4 grains (0.26 gramme); poke-root, 16 grains (1.04 grammes); berberis aquifolium, 16 grains (1.04 grammes); cascara sagrada, 16 grains (1.04 grammes). To each fluidounce (30 grammes) of this mixture 8 grains (0.52 gramme) of iodide of potassium are added, and the whole is made up in the form of a syrup. The dose is from 1 to 2 or more teaspoonfuls, three or four times a day. It is better to begin with a small dose, which is to be increased gradually, according to the condition of the stomach.

Trional and Tetronal.—According to A. Schaefer, of Berlin, ⁷⁶⁰_{Sept. 3} the actions of these remedies may be summed up as follows: 1. Trional and tetronal are two remedies of positive hypnotic and sedative action. Tetronal is somewhat more of a sedative than the other. The hypnotic effects are noticeable in ten to twenty minutes after administration. 2. Trional is a certain and prompt hypnotic in insomnia of the different forms of neurasthenia, functional psychosis, and organic brain-lesions. It is useless in cases of the morphine or cocaine habit or where pain is present. 3. Tetronal is indicated as a hypnotic in psychoses in which motor agitation is a hindrance to sleep. 4. Both remedies are unsuitable as hypnotics in cases of mental excitement which are accompanied by excessive restlessness. 5. The dose is from 15 to 30 grains (0.97 to 1.94 grammes). Single doses of 45 to 60 grains (2.93 to 3.89 grammes) and daily doses of from 90 to 120 grains (5.83 to 7.78 grammes) may be given without fear. 6. It is best given in milk or wine and just before retiring. 7. No bad symptoms are noticed following its use, except some very slight gastrointestinal disturbances. 8. A prolonged use of these drugs has shown no ill effects whatsoever, nor was the formation of a habit noticeable. Ernst Schultze ¹¹³_{No. 48, '91}; ¹¹⁶_{No. 10} reports on these congeners of sulphonal in seventy-six cases of asylum practice. In one case of slight mania and two cases of paresis, trional was given for prolonged insomnia with good effect. In the other cases in which trional was given, it was the object to produce, by a single dose, a sedative action in patients noisy at night, but it succeeded only in the milder cases. Tetronal did not act as well, and often required an evening dose of 3 to 4 grammes (46 to 62 grains). Even when sleep was not secured the patients were not so noisy. In six cases a morning and evening dose of 2 grammes (31 grains) was given, the patients becoming less noisy by day and often sleeping at night. In a case of recent mania, a dose of 2 grammes (31 grains) of trional twice daily seemed to modify the course favorably. Trional had a good effect in most of the cases of paranoia and melancholia in which it was given; and, in four cases of insomnia in mentally healthy persons, 1 gramme (15½ grains) was usually sufficient to produce sleep. Trional acted in three cases in which sulphonal had no effect. In one case sulphonal produced headache, which did not follow the use of trional. It seems to act

more quickly than sulphonal, but both it and tetronal have the disadvantage of a bitter taste. The author believes trional to be equal to sulphonal, since it acts more promptly and is not followed by unpleasant sequelæ. Experiments made by A. Ramoni⁵⁸⁹ on July 7 on fifty-one insane men in the Roman Lunatic Asylum, and in some female patients in the S. Giovanni Hospital, cause the author to conclude as follows: 1. The two new hypnotics are superior to sulphonal and chloral. 2. The patient awakes more easily, and there are no unpleasant after-effects, such as nausea, vomiting, loss of appetite, etc. 3. The action of the drugs is rapid, the effects being manifested in from thirty to sixty minutes. 4. Trional is superior to tetronal, the sleep induced by the former being more lasting and sounder. 5. Sleep after either drug lasts, on the average, six to eight hours, and is not disturbed by dreams.

Tuberculin and Tuberculocidin.—For the work done with these substances the reader is referred to other departments of the ANNUAL (see General Index).

Tubulus Lanuginosus.—This plant, found in Southern Europe, Northern Africa, and Asia,¹⁰³⁵ June 20 has, for a long time, been used in India as a diuretic, tonic, and aphrodisiac. The alcoholic extract of the pulverized fruit gives a crystalline residue, from the solution of which the active principle can be precipitated by hydrochloric acid or an alkaline chloride. There can be prepared from the drug a decoction composed of 1 part of the berry to 7 of the vehicle used, the dose being from 1 to 2 drachms (3.70 to 7.40 grammes); a fluid extract (1 part to 1) may be made, the dose being from 15 to 30 minims (0.92 to 1.84 grammes); and a syrup (1 part to 5), the dose of which is from 15 to 75 minims (0.92 to 4.60 grammes). The plant has been much recommended, especially in England. Cartanavel says that seminal emissions cease at once under its use, and that the decoction is by far the most efficacious preparation that he has ever employed for this affection.

Tumenol.—This is, according to a Berlin correspondent,²⁶ Jan. 1 a sulphonated preparation allied to thiol, and obtained from mineral oils by the action of concentrated sulphuric acid. It can be used in three forms: by itself, which is a dark-brown or brownish-black liquid; in the form of *tumenol sulphone*, or oil; and in that of *tumenol-sulphonic acid*, or powder. Moist compresses, soaked in 2- to 5-per-cent. solutions of the latter, were often successful in the

treatment of eczema of the hands and face. Tumenol-oil, in the form of a paste (5 to 10 per cent.), proved much more effective than the simple zinc paste, not only in eczema, but in superficial ulceration, impetigo, and pemphigus. An ointment of similar strength, with 5 per cent. of zinc oxide and subnitrate of bismuth, and containing simple ointment as a base, was also largely used by Neisser, who was the first to recommend the substance. The power of tumenol to relieve itching was very marked, not only in eczema and other forms of dermatitis, but also in prurigo and pruritis, especially when it was used in the form of 10-per-cent. tinctures, with a menstruum consisting of equal parts of ether, rectified spirit, and glycerin or water. The new agent is not supposed to replace ichthyol, for it lacks the antiparasitic and absorbing properties of the latter medicament.

Turpentine.—Thirteen cases of croup treated by large doses of turpentine are reported by Kellogg,¹⁹_{July 9} who states that 8 of them recovered and the other 5 died. In the 8 that recovered the disease was a sequel to a pharyngeal pseudomembrane; in 3 cases no membrane could be observed. He mentions the extraordinary case of a boy, 14 years of age, in which strangury did not develop until 15 drachms (55.44 grammes) of the oil had been ingested, this symptom appearing in the course of twenty-four hours. C. H. Balfe, of London,⁶_{Dec 5, '91} describes three cases, and refers to many others, in which turpentine, internally administered, relieved renal colic. The object in giving it is to assist in the expulsion of any concretion already formed and to prevent the formation of others. He believes that in those cases in which there is a tendency toward the constant formation of calculous concretions, as shown by a more or less frequent recurrence, the drug acts as a preventive by rendering the secretion less tenacious and viscid,—that colloid medium, which all writers who have described the formation and growth of calculous concretions insist on as essential for their development. Finally, with respect to some forms of gall-stone, not only does turpentine aid in preventing their formation, by its action on the mucous surface of the gall-bladder and by rendering the contents less viscid, but it also probably exercises an antiseptic action on the bile secreted, and thus prevents the precipitation of cholesterin, which, as is known, becomes less soluble as bile loses its natural alkaline reaction, which it does if any fer-

mentative changes take place in it. Charles W. Chapman, of London, ⁶_{Nov. 23} speaks highly of the hæmostatic properties of turpentine. He relates several cases of hæmorrhage in which turpentine stopped the flow. Intestinal, uterine, and pulmonary hæmorrhages are all similarly acted upon by it. The author found it especially valuable in hæmorrhage caused by uterine fibroids after ergot had been tried in vain. Twenty-minim (1.23 gramme) doses were generally prescribed every two hours. W. J. Eames, of the English Royal Navy, ⁶_{Jan. 23} corroborates these statements of Chapman, and says that during his period of service in the Royal Navy Hospital at Jamaica a large number of cases of typhoid fever came under his observation, and that the invariable treatment adopted was turpentine in 6-minim (0.36 gramme) doses. The results were highly satisfactory. The drug was best given in emulsion with mucilage. After a careful experimental and clinical trial with this drug, hypodermatically injected, Chantemesse, René, and Marie ¹⁴_{May 23} have come to the conclusion that such injections not only present no special advantages, but that, on the contrary, they are objectionable in many respects.

Ukambin.—This new African arrow-poison has been investigated by H. Paschkis. ²⁹⁶_{June} ⁶⁷³_{Sept.} The substance answers to tests for digitaline, digitonin, and strophanthin. Physiologically it acts like strophanthin, only more decidedly.

Vaccinium Vitis Idæa.—T. Hermann, of St. Petersburg, and S. Smirnow, of Cronstadt, ²⁹⁶_{June 8} ⁶⁷³_{Sept.} have both confirmed the anti-rheumatic properties of this plant, which is known among the laity under the names of brousnika, red bilberry, and red whortleberry. Hermann relates the case of an old man suffering from an inveterate chronic articular rheumatism, which had proved rebellious to the usual modes of treatment, but which, under the action of a decoction of the drug, showed marked improvement in a few weeks, while two months later the patient considered himself almost cured. The observations of Smirnow were made on six cases of acute articular rheumatism and three of the chronic form. All these patients had been treated before by the usual methods without success. The decoction of brousnika was given them in doses of from 30 to 60 grammes (1 to 2 ounces) in 180 grammes (6 ounces) of water, a quantity which was taken in the course of the twenty-four hours. Seven of the cases treated were cured. The duration

of the treatment lasted from one week to three months. In all cases the amount of urine was increased. Smirnow recommends the continuance of the drug, even after a cure has been effected, in order to prevent relapses.

Valerianic Ether.—This drug is highly recommended by J. D. Christman, of Allentown, Pa., ¹²¹_{Jan.} in the treatment of asthmatic attacks occurring in nervous and other disorders. It is best administered in capsules, in doses of 4 drops.

Veratrum Viride.—James P. Tuttle, of New York, ¹_{June 18} reports the remarkable recovery of a man who took by mistake, in the course of an hour, 4 teaspoonfuls of instead of 4 drops of Norwood's tincture of veratrum viride. With the exception of some vomiting, great weakness, and some pallor, no bad symptoms were observed.

Viburnum Opulus.—Attention is called to the therapeutic properties of this plant by Melville E. de Laval, of Lake Linden, Mich. ²²¹_{Dec., '91} The drug, it is claimed, acts as a sedative. It has not the power of *V. prunifolium* in checking uterine contractions or warding off a threatened abortion. If, however, the uterine contraction is dependent upon a condition of hysteroneuralgia, uterine congestion or irritation, or congestion of the ovaries, *Viburnum opulus* is highly serviceable by its sedative action. It is also valuable in dysmenorrhœa, especially when it is combined with other uterine tonics. It may be employed in the form of a fluid extract, in doses of from $\frac{1}{2}$ to 1 drachm (1.85 to 3.69 grammes); or of the solid extract, in doses of 2 to 5 grains (0.13 to 0.32 gramme).

Viburnum Prunifolium.—An excellent study of the physiological action and therapeutical applications of this plant has been published by R. L. Payne, of Lexington, Kentucky. ⁹_{Apr. 2} The author has employed it with success in cases of paralysis agitans, dysmenorrhœa, and abortion. In summarizing the physiological action of the drug he concludes that viburnum paralyzes both the centres of voluntary motion and the reflex functions of the spinal cord without impairing sensation or consciousness, and that it is consequently destined to become an approved remedy in all diseases characterized by increased excitability of the motor centres. The author employs the solid extract of the drug in doses of from 5 to 10 grains (0.32 to 0.65 gramme), and the fluid extract in doses of from $\frac{1}{2}$ drachm to $\frac{1}{2}$ ounce (1.85 to 15 grammes). In a

communication to the Congress of Balneology at Berlin, held during March, 1892, J. Landeck,⁹⁹⁶_{May 10} called attention to the chemical and therapeutical properties of this plant. The studies of the author corroborate previous investigations made in this country and in England. He found the drug to be an excellent remedy in the treatment of dysmenorrhœa, but advises that the administration should begin fourteen days before the expected menstrual period. The characteristic pains of the disorder diminished in intensity or disappeared completely under its use.

Viscum Album.—John Tascher, of Chicago,¹⁹²_{Feb.} has tried this drug in hypertrophy of the heart with insufficiency; dropsy of the extremities; small, weak pulse; dyspnœa, and inability of the patient to rest in a reclining position. Under such conditions he has observed the most astonishing results from the use of mistletoe. When given in large doses the remedy sometimes produces marked diaphoresis, increased flow of urine, and serous discharges from the bowels,—results desirable in all cases where dropsy is associated with the disease. He recommends it in all cases of cardiac weakness. It has also ecbotic properties and is indicated in all cases of passive hæmorrhage of the uterus. It may be given in the form of a fluid extract, in doses of from 20 to 30 minims (1.23 to 1.85 grammes).

EXPERIMENTAL THERAPEUTICS.

By H. A. HARE, M.D., B.Sc.,

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AND

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Aceto-ortho-toluide.—This drug is an isomer of exalgin, and has already been used, with apparent success, clinically, as an antipyretic. The physiological action of the drug has been investigated by E. Barabini,^{477 80} the results of which are embodied in the following conclusions: 1. Aceto-ortho-toluide acts chiefly on the cord, and only in toxic doses on the brain and medulla. The heart is last affected. 2. Doses of 4 centigrammes ($\frac{2}{3}$ grain) per kilogramme ($2\frac{1}{2}$ pounds) of the body-weight reduce normal temperature by about 0.8° C. ($1\frac{1}{2}^{\circ}$ F.), and bring febrile temperatures to the normal point. 3. The drug does not alter the blood-pressure, but somewhat increases the frequency of the heart-beats, though leaving the vasomotor centres unaffected. 4. It causes dilatation of the blood-vessels by direct stimulation of the nervous elements of the vascular walls themselves. The fall of temperature is, moreover, due to the loss of heat consequent on this dilatation. 5. The remedy is antiseptic, even in the strength of 5 to 1000. 6. Of the two substances, the author believes exalgin to be less antipyretic, and aceto-ortho-toluide more so, as well as more analgesic and more poisonous.

Alcohol.—That alcohol is a powerful factor in the production of hepatic cirrhosis is a well-known clinical observation. This observation appears to receive support from the recent experiments of de Rechter.²⁸⁸ The investigator undertook a series of experiments on rabbits and dogs, and the results led him to draw important conclusions. He tried first to approximate the amount of alcohol used by hard drinkers, and gave a mixture of 22.5 parts of ethylic alcohol at 96 degrees, 2.5 parts of methylic alcohol,

and 75 parts of water. Of the ten rabbits and four dogs used, four rabbits and one dog lived long enough to be of use to the experimenter; in the rabbits he found cirrhosis in the portal spaces. In places, bands of connective tissue were found uniting the portal vein with the sublobular veins, but the parenchyma of the organ was everywhere free from change. In the dog there was cirrhosis occupying the sublobular veins, where alcoholic cirrhosis is said by Sabourin to commence in man. The investigator attributes this difference in development to some modifying influence on the alcohol by the liver of the rabbit. If the experimenters have found fatty and cirrhotic change in many cases, the author attributes it to the fact that they use alcohol too short a time, and in too large doses. In an especial research on the cerebral action of some medicaments, Kraepelin ⁵⁸⁹ _{July 11; Aug. 27} ² has found that alcohol in small doses impairs the sensory functions and excites the motor ones; and that, on the other hand, in large amounts the drug first aids the motor processes and finally abolishes them. Our knowledge of the action of alcohol on the circulation is, as yet, imperfect, and whatever we have, especially in regard to the influence exercised by alcohol on the blood-pressure, is mainly contradictory. A good contribution upon the subject has recently been published by Gutnikow. ¹¹⁴ _{B.21,p.153;} ¹⁰³⁵ _{Sept. 29} His experiments were performed on curarized dogs. To these animals, under such condition, he administered alcohol in ascending doses. From the results obtained he has arrived at the following conclusions: (1) alcohol produces a diminution of the arterial pressure, due to a depression of the vasomotor centres; (2) it enhances the work of the heart; (3) it does not influence the pneumogastric nerve.

Amyl Nitrite.—In investigating, experimentally, the action of this drug upon the brain, Kraepelin ⁵⁸⁹ _{July 11; Aug. 27} ² has come to the conclusion that nitrite of amyl causes excitement of the motor functions and a slight paresis of the sensory processes.

Antifebrin.—As in the case of antipyrin, J. Horbaczewski ²¹⁶¹ _{T.C., Sec. 3, p. 191} has found that antifebrin produces, in doses of 0.5 gramme ($7\frac{1}{2}$ grains), a diminution of the uric acid eliminated by the kidneys and an increase in the number of leucocytes in the blood. Like antipyrin, it causes no atrophic changes in the spleen.

Antipyrin.—David Cerna and William S. Carter ⁸²⁶ _{Sept.} have made a special investigation of this drug, particularly on the circulation

and heat phenomena. The paper, which also includes a study of phenacetin and phenocoll, the new antipyretic (these two latter drugs are noticed in their respective places), is certainly an elaborate one, and the two chief points considered are exhaustively examined, from the point of view of the literature of the subject, as well as experimentally. The tracings and temperature charts, used to illustrate the article (all of them being original), are particularly good. The study of the authors is, to say the least, thorough, and the conclusions arrived at extremely interesting. *The blood-pressure:* In first studying the action of antipyrin on the blood-pressure Cerna and Carter made several experiments on normal animals, with various doses, and observed that both in small and moderate amounts the tendency of antipyrin is to increase the arterial pressure. Two experiments are detailed. In the first experiment the pressure rose above the normal height after the second dose, which produced convulsions, these, however, soon disappearing. The pressure continued high during the rest of the experiment, and it was observed that no more convulsions occurred. The pressure only fell just before death. Although there was at first a slight diminution in the respiratory movements, these became increased afterward in rate. The temperature remained *unaffected*, and in the final fatal issue both the respiration and heart stopped simultaneously. In the second experiment, in which comparatively larger amounts of the drug were employed, there was a fall after each injection, due, undoubtedly, to a direct depressant action upon the cardiac viscus, because such a fall was inevitably followed soon afterward by the usual rise above the normal point. The effect on respiration was similar to that of the first experiment, while the temperature was raised 0.2°C. ($\frac{9}{25}^{\circ}\text{F.}$) before the occurrence of death, this taking place through failure of the respiration. The authors found, in the course of their experimentation, that the fatal dose of antipyrin, in dogs intra-venously injected, is 10 cubic centimetres ($2\frac{1}{2}$ drachms) of a 10-per-cent. solution, or 1 gramme (15 grains) per kilogramme ($2\frac{1}{2}$ pounds) of the body-weight of the animal. In investigating the cause of the rise of the arterial pressure, the authors believe that the rise cannot be attributed to the convulsant action of antipyrin, since the same result is observed in curarized animals. In dogs under the influence of curare, and when artificial respiration was kept up

(thus preventing the occurrence of the said convulsant action, and, at the same time, any changes that might be due to respiratory disturbances), antipyrin produced phenomena similar to those effected in normal animals. This was proven by the results of the second experiment, which was similar to many others performed. In this experiment (the dog being thoroughly curarized) there was noticed a fall of the arterial pressure after each injection, but it was only temporary, and due, without doubt, to a depressant action of the drug upon the heart. The lowering of the pressure was soon followed by a considerable rise above the normal point, accompanied, as in the case of normal experiments, by an increase in the rate of the heart-beats, this latter phenomenon being in itself of great significance. Identical results in regard to the pressure were obtained in animals in which the vagi had been previously divided, and similar in those in which both the pneumogastries and spinal cord had been severed, with the application, in these latter instances, of artificial respiration. Cerna and Carter allege that it is evident from these results that antipyrin exercises no apparent influence on the vasomotor system, and that the stimulating effect of the drug upon blood-pressure, when administered in both small and moderate doses, is chiefly, if not wholly, of a cardiac origin. They believe, further, that the reduction of the arterial pressure produced by antipyrin, in both large and toxic amounts, is, independent of the vasomotor system, also due to a depressant action of the remedy upon the heart. *The pulse:* As the result of their experiments on normal animals, the authors noticed that the rate of the pulse, *pari passu* with the rise of the pressure, was generally increased. Sometimes there would occur a primary decrease, especially after the injection, due, probably, to an overwhelming action of the drug upon the heart; this decrease, however, was soon recovered from, followed by the usual increase above the normal rate. A more or less permanent secondary diminution in the number of heart-beats, accompanied with a markedly large size of the individual pulse-waves, was often observed. After previous section of the pneumogastries, antipyrin, with a single exception, was incapable of increasing the rapidity of the heart, but, on the contrary, produced a reduction of the pulse-rate. Similar phenomena were obtained when all nerve-supply to the heart was cut off by previous section of

the vagi and the spinal cord. These results led the writers to the conclusion that the primary rapid pulse is due to paralysis of the cardio-inhibitory centres; the secondary decrease to an action upon the heart itself. *The blood*: Cerna and Carter could not notice any changes in the character of the blood produced by antipyrin when administered in comparatively small or medicinal doses. In large or toxic amounts antipyrin produced a chocolate color of the blood, which is probably due to an alteration of the hæmoglobin into methæmoglobin. *The respiration*: The authors found that this function was markedly increased even by small doses of antipyrin, and, as such a stimulating effect occurred similarly after previous division of the pneumogastric nerves, they assume that it was due to a direct action of the drug upon the respiratory centres in the medulla oblongata. *The temperature*: The records show that the temperature in normal dogs was practically *unaffected*. Summarizing their conclusions, in this portion of the research, the authors state: 1. Antipyrin in small and moderate amounts produces a rise of the arterial pressure, this stimulating effect being due to an action upon the heart. 2. The lowering of the pressure by large or toxic doses is due similarly to a depressant action of the drug upon the cardiac organ; the remedy does not seem to influence the vasomotor system. 3. Antipyrin causes an increase in the pulse-rate through paralysis of the cardio-inhibitory centres; the secondary decrease in the number of pulsations is of a purely cardiac origin, the drug exercising a depressant effect upon the heart itself. 4. Antipyrin, in excessive doses only, changes the hæmoglobin of the blood into methæmoglobin.

The study of Cerna and Carter, in regard to the antipyrin on heat phenomena, is not less interesting and important. Their experiments, in this connection, were made with the ordinary calorimeter, described by Reichert some three years ago. The animals used were all healthy dogs, which had been fed the night previous to the experiment, and not allowed to eat or drink during the course of the experiment. The heat production and the heat dissipation were measured for periods of an hour. The normal production and dissipation were taken for two hours, and then the drug given, and the heat production and heat dissipation observed for three hours more. In the normal animals the drug was in-

jected subcutaneously. Most of the experimental fevers were produced by intra-venous injections of putrid blood. The subcutaneous injection, of both putrid blood and albumoses, failed to produce an immediate fever. The method of injecting one large dose of putrid blood is, according to the authors, undesirable, because it causes an intense fever, whose maximum is soon reached and then gradually falls. In the experiments described in their paper, Cerna and Carter employed intra-venous injections of putrid blood every hour, in 5-drop doses, after the normal temperature had been taken for two hours. This produced a steady fever. On the second day, the same dog, under the same circumstances, was placed in the calorimeter and his heat production and heat dissipation taken; then after that 5 drops of putrid blood were again injected every hour. After the first hour of fever the drug was given by the stomach, in order that the relative time of absorption might be determined. The authors publish some exceedingly valuable tables, giving the results of the experiments with antipyrin in normal and in fevered animals. An examination of such results shows that the fever was produced on the first day by an increase of heat production without any alteration in the heat dissipation; this increase was greatest during the first hour, and the temperature continued to rise, although the heat production fell some after the fever was established. The second day the fever produced was also due to an increase of heat production, as on the previous day; but the very next hour, after the administration of antipyrin by the stomach, there was observed a fall of 1.2° C. ($2\frac{1}{8}^{\circ}$ F.), produced by a double action: an increase of heat dissipation and a reduction of heat production. The fall of temperature was continuous till the end of the experiment. It would seem from this that antipyrin, to cause this double action, must influence the *thermotaxic* mechanism, and the composite curve which accompanies the paper shows the rise of heat dissipation. Therefore, the authors believe that such phenomenon was effected through a *thermotaxic* rather than through a *thermogenic* mechanism. In this conclusion Cerna and Carter appear to be in accord with Martin. The authors, finally, formulate this proposition: *Antipyrin produces a decided fall of temperature in the first hour after its administration in the fevered animal; this reduction is due to a great increase in heat dissipation, together with a fall in the heat production.*

From quite a number of careful observations, J. Horbaczewski²¹⁶⁴_{T.C., Sec. 3, p. 101; Sept. 20}¹⁰³⁵ draws the conclusion that antipyrin, in doses of 2 grammes (30 grains), causes a diminution in the quantity of uric acid eliminated by the urine and an increase in the number of leucocytes in the blood; that, unlike quinine, it does not produce atrophic changes in the spleen.

Atropine.—In a special investigation, Maurel⁶⁷_{Apr. 15} has observed that atropine, in doses of 5 centigrammes ($\frac{3}{4}$ grain), is able to instantly kill the leucocytes contained in 100 grammes ($3\frac{1}{3}$ ounces) of human blood, and that in quantities of 2 centigrammes ($\frac{1}{3}$ grain) the leucocytes contained in 100 grammes ($3\frac{1}{3}$ ounces) of human blood live but a few hours. On the other hand, he found that the leucocytes contained in 100 grammes ($3\frac{1}{3}$ ounces) of blood of the rabbit were not affected by a dose of 2 centigrammes ($\frac{1}{3}$ grain) of atropine. According to J. Horbaczewski²¹⁶⁴_{T.C., Sec. 3, p. 101; Sept. 20}¹⁰³⁵ atropine, like quinine, in daily doses of 1 milligramme ($\frac{1}{64}$ grain), produces a lessening in the number of leucocytes in the blood, and in the amount of uric acid eliminated by the kidneys.

Bitters, the Action of, on the Peristaltic Movements of the Stomach.—A series of experiments, to study the influence which bitters exercise on the peristaltic movements of the stomach, has been instituted by P. Terray²⁹⁶_{Oct. 8}. He used the stomachs of dogs killed after the administration of the drugs, the organs being immediately placed in a bath of salt water (0.75 per cent.) at a temperature of 38° C. (100 $\frac{2}{5}$ ° F.). The bitters employed and their doses were as follow: condurangin, 0.1 gramme ($1\frac{1}{2}$ grains); extract of quassia amara, 0.3 gramme ($4\frac{1}{2}$ grains); extract of taraxacum, 0.2 gramme (3 grains); extract of gentian, 0.2 gramme (3 grains); sulphate of quinine, 0.1 gramme ($1\frac{1}{2}$ grains); nitrate of strychnine, 0.006 gramme ($\frac{1}{16}$ grain); picrotoxin, 0.01 gramme ($\frac{1}{6}$ grain); colombin, 0.1 gramme ($1\frac{1}{2}$ grains); cetrarin, 0.2 gramme (3 grains); absinthin, 0.4 gramme (6 grains). The author arrived at the following conclusions: 1. The isolated stomach exhibits during three-fourths of an hour automatic movements; after one hour and fifteen minutes, points of strangulation are noticed, which are precursory signs of the death of the organ, but during this period contractions may be provoked by the usual irritating agents, these different agents losing gradually their power of producing contractions in the organ; it is the mechanical excitants which first

lose this power; then, in the order in which they are mentioned, cold water at 18° C. ($64\frac{2}{5}^{\circ}$ F.), the electrical current, and, finally, warm water at from 45° C. (113° F.) to 50° C. (122° F.). 2. Of all the bitters which stimulate the automatic centres of the stomach, and thus render the movements of said organ more energetic, more frequent, and more durable, are, in the first place, the extract of gentian; and then, in the order in which they are mentioned, cetrarin and condurangin, extract of taraxacum, sulphate of quinine, and, finally, the extract of quassia. 3. The substances increasing the excitability of the stomach in juxtaposition to the physical agents are the extract of gentian, the extract of taraxacum, strychnine, and colombin. 4. Absinthin in small doses diminishes the automatic movements of the stomach and its excitability; in large doses it completely arrests them. 5. Colombin and strychnine increase the excitability of the stomach to the point of provoking contractions. 6. Pierotoxin does not in any marked manner influence the automatic movements of the stomach. 7. Cetrarin, besides stimulating the automatic movements of the stomach, also increases the peristaltic movements of the intestines.

Blood-Serum.—G. d'Abundo,⁵⁹¹_{B.17,p.44,'91}; ⁶⁸Aug. following the researches of Rammo and Bordini, which prove that the serum of the blood contains a substance capable of producing the death of a puppy, upon intra-venous injections of 1 cubic centimetre (15 minims) of serum per 100 grammes ($3\frac{1}{3}$ ounces) of the animal's weight, carried out a similar study of the serum from insane patients. In general, it may be said that he found the toxic action of the serum increased in cases of insanity with excitement, and diminished in cases of mental depression and dementia.

Bromide of Ethyl.—A very valuable contribution from the Therapeutic Laboratory of the Jefferson Medical College, on the action of this anæsthetic, has been published by E. Quin Thornton and Edwin Meixell.⁸⁰_{Sept.} The authors found that the dominant action of bromide of ethyl is on the circulatory system; that the depressant effect exercised upon the respiration is only marked when large or practically excessive doses are used; that when cardiac failures ensue, it follows the presence of continuous asphyxia, the pulse-waves and entire tracing on the kymographion showing the failure to be rather the result of imperfect aëration of the blood than of a direct effect upon the heart, and that death from pro-

longed and continuous use of the bromide of ethyl only occurred from respiratory failure. Thus, in one instance, the heart continued to beat for several minutes after the respiration ceased, and, in another, for two minutes and some seconds after respiration had stopped. No exception was found to this result. In all the experiments reported by the authors there was a slowing of the pulse, with an increase rather than a decrease in the size of the individual pulse-waves. Associated with this slowing of the pulse there was a temporary slight fall of the pressure, this increasing and becoming permanent if the drug was strongly and continuously pushed. This change was not permanent, however, unless the agent also caused asphyxia, with corresponding respiratory failure. As far as could be determined by the authors, the cardiac depression is due to the blood changes, *not* to an action of the drug upon the heart. The slowing of the pulse, which was noticed during the administration of the anæsthetic, the authors believe, might be due to several causes, namely, cardiac depression, pneumogastric stimulation, or increased blood-pressure as the result of asphyxia. That it was not due to the latter is shown by the fact that the drug does not cause a sufficient rise of blood-pressure, and that the asphyxia produced by it is not the asphyxia which results in a sudden manner from vasomotor spasm, but rather the gradual on-coming asphyxia resulting from vasomotor depression, without a previous stage of increased blood-pressure. That the slowing is not due to the direct decrease in cardiac power is proved by the height of the individual pulse-waves and the prolonged cardiac activity after respiration had finally ceased. It would, therefore, by exclusion seem probable that the slowing of the pulse is due to stimulation of the pneumogastric or inhibitory nerves of the heart. In this connection, we believe that the authors might have stated that there occurred a stimulation *not* of the pneumogastric or inhibitory nerves of the heart, but of the *cardio-inhibitory centres* (peripherally?). This conclusion of the authors is believed by them to be confirmed by the fact that the slowing is put aside almost entirely by previous section of the vagi, the slowing, if it occurs, being very slight. Our theory of a peripheral stimulation is apparently confirmed by the authors' own statements following this part of the discussion, that in some instances the slight slowing of the pulse was observed after each consecutive use of the anæsthetic,

even after the nerves were cut, and from the well-maintained strength of the pulse. Regarding the respiratory function, Thornton and Meixell found that in no case was there a sudden failure of respiration, and it was noticed that the breathing might gradually cease altogether, and, after a short time, start up again if the amount given had not been excessive. This is probably due to the exceedingly fleeting action of the bromide of ethyl, which is the most volatile of the anæsthetics usually employed.

Cactina.—A new contribution to the study of the action of this imperfectly known drug has been published by Sultan.^{41: 80 Sept.} The substance used was prepared from the young flowers of the *Cereus grandiflora*. From the results obtained in a series of experiments, the author concludes as follows: 1. Cactina increases the energy of the cardiac contractions. 2. The drug heightens the arterial pressure and greatly increases the height and force of the pulse-wave. 3. It exerts an influence upon the nervous system through a direct action upon the motor centres of the spinal cord, and produces reflexes and increases the general nervous tone. Cactina may, therefore, be considered as a cardiac tonic of no mean value. The results of Sultan appear to be in accord with those obtained by Meyer, noticed in last year's ANNUAL (vol. v, B-10).

Caffeine.—To find out what influence caffeine exercises on nutritive changes, Keerlein^{216 1035 B. 61, p. 166; Sept. 29} instituted a series of experiments, using the apparatus devised by Geppert. This apparatus consists principally of a chamber to receive air, connected with two cannulas, each provided with independent valves. An animal (a rabbit, for instance), upon which tracheotomy had been performed, is made to breathe into the chamber. The expired air, deprived of its carbon dioxide, is returned into the chamber by means of one of the cannulas. By this ingenious method, the chamber, after each respiratory movement, receives a quantity of oxygen equal to the difference between the quantity of this gas contained in the inspired air and the quantity contained in the expired air. This difference represents the total amount of oxygen consumed by the animal. It was found that caffeine, in doses sufficiently small so as not to produce spasmodic symptoms, increased the quantity of oxygen consumed in the proportion of 16, 17, and 19 per cent. On the other hand, the product of distillation of coffee, which is especially charged with caffeol, exercises

no influence whatever in regard to the consumption of oxygen. To judge, therefore, from these results, caffeine and coffee are not economical substances; on the contrary, they are stimulants to nutrition, and the effects which they produce are undoubtedly the result of a direct action on the nervous system.

Chloral.—From a series of experiments instituted by Kraepelin⁵⁸⁹ ² with the object of investigating how drugs influence the brain, the author has obtained results that show an impairment of both the sensory and motor functions under the action of chloral. A contribution to the study of the anæsthetic action of chloral, especially when combined with morphine, has been published by Cadeac and Malet.²¹¹ ^{Feb. 14} After speaking of the inconveniences and serious accidents which frequently occur to the dog and cat upon the administration of anæsthetic vapors, the authors detail a series of experiments with chloral, in which they found that when the drug is injected into the vessels it produces complete and lasting anæsthesia. It was also found that, when introduced hypodermatically, the drug was likely to produce gangrenous inflammation. A number of other experiments in other animals all prove that chloral possesses anæsthetic power; particularly is this so when it is associated with morphine. The authors arrived at the following conclusions: 1. The combined action of chloral and morphine is better for the production of anæsthesia in the lower animals than inhalations of chloroform and ether. 2. Injections of the two agents in the dog and horse, in the proportion of 5 drachms (20 grammes) of chloral to $1\frac{1}{2}$ grains (0.10 gramme) of morphine, will produce anæsthesia in a dog weighing 60 pounds (24 kilogrammes); whereas, 4 ounces (120 grammes) of chloral and 15 grains (1 gramme) of morphine, when given in this manner, will completely anæsthetize a horse. The authors add that morphine may, however, be injected under the skin if it is considered desirable.

Chloride of Ethyl.—What we may call a preliminary study of the action of the new anæsthetic, chloride of ethyl, has been published by H. C. Wood and David Cerna.⁸⁰⁵ ^{June} It is at present employed almost exclusively as a local application, and it acts, according to the authors, not by virtue of any inherent properties which it might possess, but on account of the intense cold produced by its extraordinarily rapid volatilization. The extreme

volatility of the chloride almost proves, *a priori*, that any effect which it may have upon the human system will be of correspondingly brief duration, since very volatile substances are exhaled with rapidity. This *a priori* reasoning appears to be entirely confirmed by the results of the experiments described by the authors. Wood and Cerna have found it difficult, without the construction of special inhalers for the application of large quantities of the chloride, to produce anæsthesia in the dog by the ordinary method of administration. The drug disappears from an inhaler which allows free access of air almost as fast as it can be poured in. They used it in two ways. In the first place they connected a large rubber tube with a cannula placed in the trachea of the dog, and then forcing the anæsthetic into the tube in such a way that it could diffuse itself over the walls of the tube for a considerable distance. The administration in this way of 10 grammes ($2\frac{1}{2}$ drachms) of the chloride of ethyl failed to produce distinct anæsthesia in the dog, although the respiration was affected and some fall of the arterial pressure occurred. The authors detail two experiments: In the first experiment the arterial pressure was reduced at the beginning and then varied considerably; in the second the arterial pressure was at first slightly diminished, and afterward a gradual rise was observed. The pulse was increased in rate from the start, then fell, together with the pressure; and this reduction lasting for several minutes, it became rapid again. In neither of the two experiments was anæsthesia produced, although in each one 10 grammes ($2\frac{1}{2}$ drachms) of the chloride were employed. Besides using the chloride in the way described, the authors made an experiment in which a cone, almost impervious to the air and so flexible that it could be tightened around the dog's nose, had placed in it 10 grammes ($2\frac{1}{2}$ drachms) of the liquid, and then tightly applied. The first dose produced anæsthesia which lasted about two minutes, but no effect at all was caused by the second dose of the same quantity. The results of this experiment proved that the chloride is capable of producing anæsthesia, provided that the vapor of the drug be given in concentrated form. Why anæsthesia was not caused by the second inhalation was not clear, but Wood and Cerna believe that it was because air was taken in more freely, owing to the cone not having been placed tightly over the nose of the animal. The results

of the experiment showed (1) that the effect of the drug is exceedingly fugacious, since 10 grammes ($2\frac{1}{2}$ drachms) failed to produce complete anæsthesia of more than two minutes' duration, and this in spite of the fact that air was not furnished with sufficient freedom to yield the full supply of oxygen to the blood; (2) that the anæsthesia is accompanied with a marked fall in the rate of the pulse and the force of the arterial pressure. Wood and Cerna also found that the effect of the chloride of ethyl upon the respiration is very marked. If the dose was sufficient to produce anæsthesia, the respiration at first was often stimulated in the extent of the movements as well as in the number per minute. In all their experiments the fall of the blood-pressure, after the injection of the chloride, was immediate and excessive; the pressure continued low without rise during the whole period of anæsthesia, but returned rapidly to the normal point as anæsthesia wore off. The cardiac beats were always at first arrested, but subsequently became of enormous size and continued so almost to the end. The pulse-waves were also at this time absolutely consonant with, and proportionate to, the respiratory movements. Concluding, finally, from the results of the research made at the Laboratories of the University of Pennsylvania, Wood and Cerna believe that their investigation has shown (1) that the chloride of ethyl is capable of acting as an anæsthetic, but that it is eliminated with extraordinary rapidity and that its action is extremely fugacious; (2) that the anæsthesia which it produces is always accompanied by a fall of the blood-pressure, which is probably, at least in part, due to a direct depressing effect of the drug upon the heart; (3) that the action of the drug upon the circulation is in no way dependent upon its influence on respiration, although it is not certain that the pronounced depression of the blood-pressure is not a factor in influencing respiratory movement; (4) that, at least in the dog, chloride of ethyl produces at first an increase of the respiratory movement, either in rate or amount, or commonly in both; but that, finally, respiration becomes slow, and at last stops almost abruptly; (5) that, usually, the cessation of heart-beat and the arrest of respiratory movement occur nearly simultaneously; that, as the practical result of the various experiments performed with chloride of ethyl, they believe that the fugaciousness of the action of the drug must interfere with its use as a

general anæsthetic, and that its depressing effect upon the circulation is too pronounced to permit its use with safety ; and that it is most probable, if it should come to be employed in practical medicine as an anæsthetic, there would be a record of sudden deaths through cardiac failure proportionately more numerous even than those caused by chloroform.

Chloroform.—The literature regarding the action of chloroform is quite extensive, and yet, notwithstanding the many able researches made upon the subject, exactly how the anæsthetic influences the organism has not been definitely established. As already noticed in previous editions of the ANNUAL, the results of most of the experimental work upon the subject has been mainly contradictory. It is curious to observe that the conclusions arrived at by the second Hyderabad Commission were entirely opposed, in the chief points, to those drawn by the first Commission, and yet the investigations in both cases appear to have been exhaustive.^{6 July 10} This contradictory evidence on a subject that is of the highest importance, scientifically and practically, has led H. H. the Nizam of Hyderabad's government to invite H. A. Hare to undertake a new investigation on the action of chloroform. The results of this study will appear at an early date. In this connection Edward Lawrie has addressed to Hare a letter bearing upon the subject. The document contains some valuable points which are worth considering. Lawrie says, among other things, that his students administer chloroform with perfect safety in all cases which are fit for operation. The principles upon which such practice is based are that the heart is never affected by chloroform except by overdosing ; and that safety, or the avoidance of overdosing, is guaranteed by regular breathing. It is not necessary to add that the administration must not be pushed beyond full anæsthesia, because, if it is, the essential condition, which is normal respiration, cannot be maintained. It stands to reason that, if these principles are unassailable, they must be founded on sound physiology, and experiments on animals must accord with them. The writer is satisfied that the Hyderabad Commission's experiments not only accord with them, but entirely confirm clinical experience. Yet, in spite of Lawrie's assertions, other authorities deny the correctness of the Commission's last conclusions. The writer goes on to say that Gaskell believes that the lowering of the blood-pressure

by chloroform is due to weakening of the heart, and is therefore dangerous, and that this action of chloroform is shown in the tracings of the Hyderabad Commission's experiments. The contention of the Hyderabad Commission is, however, that the fall of the blood-pressure under chloroform is in itself harmless, and is due to vasomotor narcosis. Gaskell says that certain clinical teaching is correct, but that teaching will never be accepted as long as those who uphold it insist that the heart is not affected directly by chloroform. Lawrie replies: "In order to get our teaching believed in, should we first of all adopt a theory which is altogether opposed to it?" Gaskell further remarks that the true physiology on which the teaching of the clinicians alluded to is founded is, that chloroform does affect the heart directly, but that they never produce this action because they take good care not to give the concentrated vapor of the drug. To this statement Lawrie answers that such is not the case, and that the only fear entertained in regard to the concentrated vapor is that it may interfere with the breathing. If the breathing is regular there should be no fear of how concentrated the vapor of chloroform would be. In Lawrie's opinion the experiments of the Hyderabad Commission explain precisely and clearly the reason why the administration of chloroform on Syme's principle is free from risk. It is not pretended that these experiments demonstrate exhaustively all the causes of the fall of the blood-pressure under chloroform, but they prove that the fall of pressure, according to the writer, from the *direct* effect of the drug is harmless. This could not be the case if it were due to weakening of the heart, and it is in all probability entirely accounted for by vasomotor narcosis. When the respiration is failing, or stops, from overdosing, the fall is increased by the consequent interference with the action and nutrition of the heart, and becomes dangerous in proportion to it. The action of the heart may be injuriously affected at any time during the inhalation of chloroform by abnormal or irregular respiration. Moreover, the vagus nerve may be brought into play and stop the heart and cause sudden falls of the blood-pressure. These falls are not of themselves dangerous, but they are warnings of asphyxia or of overdosing, or both combined. They can never take place clinically if the respiration is properly attended to. Lawrie continues discussing the subject as follows: "The whole controversy on

chloroform turns on one point: Is the fall of blood-pressure under chloroform harmless, as we say it is, or dangerous, as is asserted by our opponents? In the present state of our knowledge three main factors are concerned in the lowering of the blood-pressure shown in the tracings of the Hyderabad Commission: 1. Narcosis of the vasomotor centre or centres, due to the direct action of chloroform; this is harmless and does not appreciably affect the pulse. 2. Stimulation of the vagus, due to the indirect action of chloroform; this is also harmless, but it is a sign of dangerous administration and stops the pulse temporarily. 3. Weakening of the heart from narcosis of the respiratory centre and failure of the respiratory function, due to the indirect action of chloroform as regards the heart, and the direct action as regards the respiratory centre; this is excessively dangerous, and, if the respiratory function is not restored, proves fatal. It weakens and permanently stops the pulse." Lawrie, in concluding his remarkable letter, goes on to state that the lowering of the blood-pressure, from a clinical stand-point, is inseparable from the effective inhalation of chloroform, but that the falls of pressure due to stimulation of the vagus and weakening of the heart ought never to occur. "If they do, they are the result of improper administration or overdosing. Our principles form the true guide to the only safe method of chloroform administration, which consists in the concentration of the chloroformist's attention on the respiration alone throughout the entire inhalation. The 'direct heart' theory leads to attention to the pulse at the expense of the respiration, and has undeniably resulted in a certain percentage of deaths under chloroform over and above those which are liable to occur from mere accident or carelessness under any system of administration." We anxiously await the results of the independent research to be conducted by Hare,—results which may help to throw light upon the long-mooted question of the action of chloroform. In regard to the action of chloroform upon the brain, Kraepelin,⁵⁸⁹ July 11; ² Aug. 27 after a careful research, concludes that the drug acts like ether, but more rapidly, causing at first a paralysis of the sensory and excitation of the motor processes, and afterward a complete abolition of the latter ones.

Cocaine.—An exceedingly interesting study of the local paralyzing action of cocaine upon the nerves and nerve-centres has

been published by François-Franck.^{410 213}
July, Sept. The author sustains the theory that the drug, in sufficiently concentrated solution, suspends the activity of all living tissue elements. He contends that cocaine is a powerful paralyzing poison, acting alike on sensory and motor nerve-endings, on all kinds of peripheral nerves, on nerve-centres, on muscles, glands, epithelium, leucocytes, vegetable protoplasm, micro-organisms, etc. According to his careful studies, any nerve belonging to the cerebro-spinal or sympathetic system can be functionally divided, in a limited zone, by applying a dose of cocaine of from 5 to 10 milligrammes, the dose depending on the size of the nerve and the mode of administration. The results are so interesting that we cannot but draw largely and closely from the substance of the exhaustive article. The author shows that the paralytic effect produced is progressive: slow, if the nerve is simply placed in a concentrated solution of the drug; rapid, if the alkaloidal solution is injected into the sheath of the nerve. The action is so gradual that the transition from the normal to the paralyzed condition can be easily observed. The loss of the function is so complete that it would appear that a section of the nerve had been practiced. Observing carefully, it will be found that the paralysis does not extend more than one or two centimetres beyond the point that has been in contact with the drug. The function of the nerve is restored by the withdrawal and elimination of the alkaloid. These results are exceedingly interesting, since, according to the author, the use of cocaine permits the survival of animals, in which nerves indispensable to the maintenance of life, such as the pneumogastrics or phrenics, have been functionally divided. The local action of cocaine, therefore, may be employed where section was previously necessary, and without any ultimate injury to the nerve. The author goes on to show that nerves affected by cocaine evince at the beginning a slight increase of excitability, then a more or less prolonged loss of function, which, gradually disappearing, is followed by a short period of hyper-excitability before the return to the normal condition. The investigator studied the action of the drug upon the blood-pressure and the respiration, as the result of local application of the alkaloid to the pneumogastrics of the dog. Tracings accompany this portion of the investigation. The respiratory changes induced by the destruction of sensory peripheral stimuli are compared and contrasted with those

changes brought about by paralysis of the corresponding centres in the medulla. The results obtained in this manner are most interesting. For instance, by applying cocaine to the floor of the fourth ventricle, respiration may be arrested by a central paralysis. And here it is worthy of note that the arrest of the respiratory function is brought about not by slowing the movements, but by a gradual diminution of the extent of such movements. The result of this experiment appears to show that the centres which regulate respiration escape the action of the drug not because of any resisting power to cocaine, but because such centres are to be sought higher up than the medulla. It also shows that this method of studying the cortical centres is of exceeding value. By it the reflex mechanisms and all central influences may be temporarily suppressed, while the surrounding parts are not really affected, as when section is practiced, such being further proved by the fact that functional activity is fully restored after the withdrawal or elimination of the drug.

Cocculus Indicus.—Blanc¹⁰⁸_{July 1} has written of the botany and history of this plant and its berry, and especially of the glucoside of the berry, picrotoxin. Some authors hold that this is a definite compound, having the formula of $C_9H_{11}O_4$, while others consider it a mixture of picrotoxin, picrotin, and anarmitin, of which picrotoxin is the most active and bitter portion. It is distinguished from the alkaloids by not being precipitated by the ordinary reagents and by reducing solutions of copper as glucose does. Its effects have long been studied, and its toxic action may be divided into three stages, as follows: 1. Agitation, inco-ordination, general tremors, acceleration of the pulse and respiration, and sometimes vomiting. 2. The animal makes sharp movements backward, followed by tonic convulsions and opisthotonos, soon succeeded by general tonic convulsions, these beginning at the anterior portion of the body; the mouth is frothy, the tongue bitten, and there is cyanosis of the lip and tongue and evacuation of the urine and feces. 3. There is slowness of the respiration and the circulation, lowering of the temperature, and collapse, with apparent death; soon the animal regains consciousness for a short time, to be followed by a paroxysm stronger than the first, and thus paroxysms and periods of quiet alternate, the first increasing and the latter decreasing in length if the result is to be fatal, and the contrary

taking place if the animal is to recover. Post-mortem, the lesions are those of epilepsy ; the muscles are elevated in temperature and rapidly lose their contractility.

Creasote.—The interesting subject of the elimination of creasote by the urine has been experimentally studied by E. Main and Gaillard.⁶⁷_{May 30} For the detection of the drug in the urine, when given hypodermatically, by the rectum, or by the mouth, the authors have employed the following methods: 1. Direct examination of the urine. 2. Treating the urine with ether, according to Kugler. 3. By evaporation and distillation, as recommended by Grasset and Imbert. 4. By distillation, as practiced by Sallet. On the whole, Main and Gaillard have obtained the best results by Sallet's methods, which they consider the most simple and delicate at the same time. The reactive agents were nitric acid and ammonia. These give, with normal urine, a pale-yellow coloration, but with creasoted urine a beautiful deep-yellow hue, which increased in proportion to the amount of medicament ingested, but varied according to the manner in which the drug was introduced. Thus, the reactions obtained in the urine of patients who had received the remedy hypodermatically were the least pronounced ; but in those cases the elimination by the lungs was always greater and more rapid. Bromine-water gave a precipitate, but only in the distillate of creasotated urine. Similarly, perchloride of iron produced, in certain cases, a brownish precipitate. The authors conclude, from these results, that if the creasote is eliminated by the lungs, it is likewise, and largely, eliminated by the kidneys, notwithstanding the influence that may be exercised by the mode of administration. In an interesting study in regard to the same subject of elimination of creasote after rectal and hypodermatic administration, L. Imbert,⁶⁷_{June 16} has arrived at important results. The drug is eliminated in the form of the sulphate of guaiacol and creasol-potassium sulphate, but just where the change occurs is difficult to determine. At all events, it does not take place entirely in the liver, as has been alleged, since the change occurs when the drug is injected subcutaneously or by the rectum, and it probably takes place in the tissues themselves. After hypodermatic injections of 3 grammes (45 minims) of creasote dissolved to the strength of 10 per cent. in oil, 0.90 gramme ($13\frac{1}{2}$ minims) was recovered in the first four hours, 0.91 gramme ($13\frac{2}{3}$ minims)

in the second four hours, 0.16 gramme ($2\frac{1}{2}$ minims) in the third four hours, 0.05 gramme ($\frac{3}{4}$ minim) from the twelfth to the sixteenth hour, and a trace up to the twenty-eighth hour, after which no reaction could be obtained. It could be detected thirty-six hours after the injection of 2 grammes (30 minims), showing conclusively that the larger dose did not lengthen the time of elimination. There would be, therefore, no advantage in administering large doses, the object being rather to keep the drug in constant contact with the tissue than to secure a copious elimination. After rectal injections of 1 gramme (15 minims), 0.60 gramme (9 minims) was recovered in the first twelve hours in one case and 0.54 gramme ($8\frac{1}{10}$ minims) in another case. The rectal injections of 2 grammes (30 minims) gave 0.96 gramme ($14\frac{2}{5}$ minims) recovered from the urine, a quantity superior to that recovered after the subcutaneous injection of a like amount. In both methods of administration the red reaction with potassium and chloroform was obtained in the sputum for the first twelve hours, but distillation never gave any of the products of elimination, showing that its elimination by the lungs is very small, and that its therapeutic value can hardly rest on this. No color reaction is obtained in any case in the sputum after twelve hours. The use of large doses shows that relatively less was recovered after large than after small amounts had been used. It results from these studies that the rectal administration was preferable, as being most convenient and easy to repeat frequently. In a subsequent note, Imbert⁶⁷_{Sept. 15} has endeavored to determine whether, after the injection and absorption of creasote, any of the bodies (creasol, guaiacol, and phlorol) is eliminated in greater quantities than the others. After an injection of 2 grammes (30 minims) of guaiacol, the investigator was able to recover from the urine 1 gramme (15 minims) of the substance given; after an injection of 2 grammes (30 minims) of a mixture of guaiacol and creasol, he could recover only 60 centigrammes (9 minims) from the urine; and in the third instance, after administering 2 grammes (30 minims) of a mixture of creasol and phlorol, the same amount of 60 centigrammes (9 minims) could be recovered from the urine. The author, therefore, believes that the various elements of the creasote are eliminated in the urine almost in the same proportion; but that it seems, however, that the guaiacol is the most important from an elimination point of view.

Croton-Oil.—By injecting croton-oil into the ear of a puppy and at once plunging the other into cold water, at 15° C. (59° F.) and under, S. Samuel²⁰_{B.127,p.467} found that, during the course of such an immersion of the well ear, no inflammation appeared in the crotonized ear. Neither the arterial congestion followed, nor the infiltration which Samuel found as one of the earliest results after the application of the irritant in the cold atmosphere. The rectal temperature sank, as a rule, but in some instances was increased, the lowering of the temperature occurring first after rather prolonged immersions and irregularly. The disappearance of the inflammatory phenomena, as the control experiments indicated, occurred much earlier than the lowering of the temperature, the inference being that the dependence of the former upon the latter is unnecessary. Samuel sought to explain the entire phenomena upon a reflex nervous action (the transference of the arterial contraction of one side to the other), but, as the author acknowledges, this hypothesis is not satisfactory, inasmuch as the same result occurs if the opposite ear is not subjected to cold; but the latter is applied to one of the extremities. From this consideration, therefore, it would not seem improbable that the cooling of the blood was in some way responsible for the retardation of the inflammatory phenomena.

Cupreine.—The hydrochlorate of cupreine, a salt of a new derivative of a species of cinchona, has been studied by Laborde,³_{July 6} his results having been communicated to the Société de Biologie. The salt was injected hypodermatically and found to possess properties similar to those of quinine.

Degeneration, the Reaction of.—An exhaustive physiological research on the reaction of degeneration has been made by Th. Krajewska.¹⁹⁷_{Sept.20} The authoress has reproduced two principal characters of degeneration: always, by a slow and persistent contraction; in the third instance, in the majority of cases, by the prevalence of the anode, employing three methods, that is, a slow-closing current, curarization, and anæmia. These latter methods bring about the cessation of the action of the nerve on the muscle in regard to electrical irritability. In these three series of experiments the contraction of the muscle remains as a function of the muscular tissue alone, without the interference of nerve-action. From all the experiments described by the authoress, a deduction

has been brought forward, a deduction applicable to all pathological cases characterized by a reaction of degeneration. In these pathological cases, the following phenomena are spoken of by various observers: (1) inexcitability of the muscle by the faradic current; (2) inexcitability of the nerve by galvanic and faradic currents; (3) the unaltered excitability of the muscle by the galvanic current; (4) slowness, and persistence of muscular contraction; (5) increase of the excitability by the anodal closure. Putting the description of these phenomena in physiological language, there are: (1) complete disappearance of the neuro-muscular contraction by irritation of the intra-muscular fibres; (2) a complete disappearance of the neuro-muscular contraction by irritability of the nerve-trunks; (3) excitability proper of the muscle, idio-muscular contraction retained in its integrity, with (4) the usual characters of idio-muscular contractions, such as slowness, persistence, and with (5) an easy and frequent prevalence of the anode. The histological changes of the muscular tissue may influence the disappearance of the function of the same, but only in those cases in which the changes of the whole muscle are brought about. If the muscular contraction is affected, it may be said that the functional activity of the fibres, and, at the same time, the integrity of such fibres, remain intact. The muscle is a complex organ; it contracts without undergoing any strain, so to speak, and without all the fibres taking part in the contraction. A certain quantity of force is expended to transform the completely relaxed fibres into a condition of tension. If, from any cause, in a paralyzed muscle, a certain number of fibres degenerated, atrophied, do not take part in the contraction on the application of a direct electrical irritation, the contraction of the muscle as a tissue does not suffer much. Thus Brown-Séguard, Charcot, Schiff, and Vulpian are in accord, when they affirm that in paralysis the electrical excitability of the muscle may persist for months and even years. The histological changes of the muscle are but little apparent, even in cases of paralysis of long standing. Now, then, if the paralyzed muscle reacts to a galvanic irritation, by a contraction, this contraction is the result of the functional activity of the *normal* fibres, and is manifest by characters properly *normal*. When the number of fibres, contractile organs, is infra-physiological, so to speak, then the muscle fails to respond to galvanic irritation. All these

considerations, and the results of her beautiful and careful experimentation, led the authoress to formulate the following conclusions: 1. The reaction of degeneration cannot be experimentally produced in animals by traumatic injury of the nerve. 2. The reaction of degeneration, from a clinical stand-point, correspond. altogether to the physiological phenomena produced by elimination of the nervous action. 3. This elimination of nervous action may be produced by a slow-closing current, curarization, and anæmia. 4. During this elimination of nervous action, the muscle retains all the normal characters of the idio-muscular contraction. 5. The reaction of clinical or experimental degeneration, answering the characters of the normal idio-muscular contractility, ought not to be designated by this formula: $ASZ > KASZ$, but by this one; No shock, persistence of the idio-muscular contractility.

Digitalis.—A very valuable research on the action of digitalis is published by Robin.<sup>17 80
No.10; Apr.</sup> From the interesting results obtained, the author draws the following conclusions: 1. When given in powder, digitalis is an irritant to the mucous membrane of the stomach. 2. Digitalis undoubtedly possesses a cumulative influence, and its active principles are eliminated very slowly from the body. 3. In small doses, the drug slows the action of the heart, but in large quantities it causes an acceleration. It is important to remember that the action of the drug persists for a long time after its ingestion. 4. Digitalis, in small doses, increases the arterial pressure, but large ones diminish it. The respiratory movements are accelerated by small doses and decreased by large ones. 5. The excretion of nitrogenous materials, or, in other words, tissue waste, is diminished by small doses of the drug, the urea being decreased from 26 to 17 grammes ($6\frac{1}{2}$ to $4\frac{1}{4}$ drachms). 6. Diuresis is enhanced by digitalis, and, when given in large amounts, it produces an increase in the quantity of urine secreted.

Diuretin.—One of the best contributions to the study of the physiological action of this new agent is that furnished by Ivan M. Sabashnikoff.<sup>2005 26
No.57, p.146; Aug.</sup> The author conducted a very elaborate series of experiments, and his work, which appeared in the form of a monograph, contains some very valuable graphic tables to illustrate the subject. The experiments were performed on frogs, rabbits, cats, and dogs. The drug was administered into the lymphatic sacs of frogs, into the veins, internally or hypodermatically,

in the case of mammals. It was found that, when given in large doses by the stomach, diuretin produced vomiting quite often, while hypodermatically it was apt to cause severe irritation and pain. The drug was, therefore, given intra-venously, in order to insure the fairest results. The conclusions arrived at by the author, in his complete and most excellent study, are so interesting and important, that we cannot but transcribe them in full. They are as follow: 1. In rabbits and puppies the double salicylate develops a powerful diuretic action, the effect appearing immediately after the intra-venous injections. 2. In adult dogs, however, no diuretic effect can be noticed. On the contrary, the administration of the drug is followed by a decrease in the secretion of urine. 3. The inhibition can be prevented and a diuretic effect secured by previously narcotizing the animal, with hydrate of chloral or morphine, and dividing the vagi and splanchnics, or the cerebral hemispheres. 4. The salicylate induces a diuretic effect mainly by virtue of a direct stimulating action on the renal epithelium. 5. Contrary to Schroeder's views, diuretin is a poison. In warm-blooded animals it attacks, in the first instance, the nervous system. Both large and small doses of the drug manifest an exciting action on the brain, which effect, however, is apparently short-lasting. It was found, in this connection, that after an intra-venous injection of diuretin, in the dose of from 0.15 to 0.25 gramme ($2\frac{1}{4}$ to 4 grains) per kilogramme ($2\frac{1}{2}$ pounds) of the body-weight, irritability of the motor area of the brain sharply increases at first, but soon afterward returns to the normal point, or even falls below it. 6. After an injection of diuretin in the dose of from 0.2 to 0.5 gramme (3 to $7\frac{1}{2}$ grains) per kilogramme ($2\frac{1}{2}$ pounds) of the body-weight, the cardiac action grows slower at first, but in a few minutes the cardiac beats become considerably more frequent and more energetic. Very large doses produce an irregularity of the pulse. On the whole, the influence of the substance of the heart seems to be analogous with that of Pavloff's "intensifying cardiac nerve." 7. The arterial pressure falls from the beginning, and remains below the normal during both of the stages; that is, during the period of cardiac retardation and that of acceleration. 8. Even in small doses diuretin nearly always quickens the respiration, while large quantities cause an intense dyspnoea. 9. In dogs the minimum fatal dose is about 0.7 gramme ($10\frac{1}{2}$ grains) per

kilogramme ($2\frac{1}{2}$ pounds) of the body-weight. 10. Death is produced by a simultaneous arrest of the heart and respiration, the heart stopping in diastole. 11. Diuretin invariably increases the bodily temperature. After non-lethal doses, as, for example, 0.5 gramme ($7\frac{1}{2}$ grains) per kilogramme ($2\frac{1}{2}$ pounds), the elevation amounts to 1° C. ($1\frac{4}{5}^{\circ}$ F.), the temperature subsequently returning to the normal standard. After lethal amount, say 1 gramme (15 grains) per kilogramme ($2\frac{1}{2}$ pounds) of the body-weight, the temperature rises as high as 3° C. ($5\frac{2}{5}^{\circ}$ F.) or 4° C. ($7\frac{1}{5}^{\circ}$ F.), and even higher, and remains at such elevated level till the occurrence of death. 12. In cases where the administration of the drug is preceded by a high division of the cord, no elevation of the temperature is ever observed. 13. It is, therefore, obvious that the rise of the temperature, occurring after the injections of the salicylate, is dependent upon an increased heat formation, due to a stimulating action of the remedy on the cerebral thermic centres. 14. Upon the striated muscular fibre, the action of diuretin resembles that of caffeine. 15. Large doses of diuretin cause vomiting and diarrhoea. 16. The drug increases the secretion of saliva. 17. Diuretin possesses no cumulative action.

Ether.—Chipiline^{586 67}_{No.15; July 30} has made a series of experiments with the view of studying the effects of sulphuric acid upon nutrition. Each experiment was divided into three periods of four days each. The ether was administered in doses of 25 drops, three times a day, during the second period. The individuals experimented upon were young and healthy, the ages varying from 19 to 21 years. The author obtained the following results: 1. The assimilation of nitrogen was bettered in all the experiments. In one-half of the cases this amelioration was maintained during the third period. 2. The nitrogenous elimination was in all cases diminished, but this diminution was not maintained during the third period. 3. The quality of the nitrogenous elimination was equally ameliorated in all cases. This amelioration was maintained during the third period. Ether rapidly paralyzes the sensory processes of the brain and excites the motor; in large doses it increases the sensory paralysis, and eventually abolishes motion. These are the results observed by Kraepelin^{589 2}_{July 11; Aug. 27} from a special experimental research.

Fluoride of Sodium.—See Sodium Fluoride.

Formol.—This substance, also called formaldehyde, has been studied by Berlioz.^{296 80}
Mar. 8; July 15 The author found that the drug was not very poisonous when subcutaneously injected. It did not kill a rabbit in doses of 5 grains (0.33 gramme) per pound (0.4 kilogramme) of the body-weight; but in quantities of 8 or 10 grains (0.50 or 0.70 gramme) it caused immediate effects, the animal going to sleep at once, and finally dying without the manifestation of convulsive movements. Intra-venously injected, amounts of $\frac{1}{4}$ grain (0.015 gramme) were also without effect in the rabbit; but $\frac{3}{4}$ grain (0.05 gramme), administered into the vein of a dog, produced death. The drug, according to the author, is eliminated by the urine in the course of twenty-four hours, the urine resisting putrefaction for twenty-four hours longer. Even on the second day little putrefactive changes are noticed. The temperature, under the action of formol, is lowered from 1° C. to 2° C. ($1\frac{4}{5}^{\circ}$ F. to $3\frac{2}{5}^{\circ}$ F.). Berlioz was unable to preserve guinea-pigs from becoming infected with charbon, when treated with formol.

Gallic Acid.—It has long been known that when gallic acid is taken internally it can be found unchanged in the urine, and Whöler and Frerich^{83 90}
B. 16, H. 4.5.; July stated that when tannic acid is ingested it is excreted in the urine as gallic and pyrogallic acid. Lewen afterward showed that in the rabbit at least some tannic acid is met with in the urine after its ingestion as well as gallic acid, and six years ago Stockman proved that, while in man some of the gallic acid taken passes unchanged, some of the tannic acid is excreted in the urine as gallic acid, and neither pyrogallic acid nor tannic can be found in the urine after tannic acid has been taken. In dogs and rabbits, however, the tannic acid is excreted partly as gallic acid and partly unchanged, or, at least, in combination with alkalies. Mörner has made investigations which completely confirm Stockman's results, and, further, estimated the amount of gallic acid present in the urine after definite doses of gallic and tannic acids. For this purpose he has employed a modification of a plan similar to that suggested by Wolkow and Baumann for the estimation of homogentisinic acid in the urine, which depends on the reducing action of gallic acid on ammoniated-silver solution. The author of this research, Mörner, finds that the proportion of gallic acid excreted in the urine largely depends on the amount given in one dose. If a drachm (4 grammes) to

a drachm and a half (6 grammes) be taken, 30 per cent. passes in the urine; if 30 grains (2 grammes), only 21 per cent.; after 22 grains (1.5 grammes) only 5 per cent. could be detected; after from 7 to 15 grains (0.5 to 1.0 gramme), only 2 per cent.; while a dose of 3 grains (0.20 gramme) was not followed by the appearance of any gallic acid in the urine. As he examined the fæces in vain for any trace of gallic acid, it follows that a certain portion is burnt up in the system in its passage through the body. He finds that after tannic acid has been taken only very little gallic acid passes into the urine. The administration of 30 to 60 grains (2 to 4 grammes) of tannic acid is, indeed, followed by the appearance of a trace of gallic acid in the urine, but so small is the quantity that he could not estimate it. Only when 2 drachms (8 grammes) of tannic acid had been administered was the quantity of gallic acid sufficient to allow of its quantitative estimation, but only 1 per cent. of tannic acid taken was found in the urine as gallic acid: since tannic acid could not be found in the fæces, he concludes that the greater part of the tannic acid which is absorbed is burnt up in the body. In explanation of the very small quantity of tannic acid which appears in the urine changed into gallic acid, he suggests that the former forms, with albumen, combinations difficult of solution; these pass into the intestine and there slowly decompose. The tannic acid is, indeed, converted into gallic acid, but only gradually, and the small quantities of gallic acid thus produced are burnt up, and, therefore, never appear in the urine. On the other hand, when gallic acid is taken, owing to its great solubility it is absorbed and, entering the blood at once, only a small quantity is burnt up and the larger quantity excreted. The investigation, on the whole, is thorough, and appears to have established definitely the real behavior of both acids in the organism.

Glymol.—M. Hildebrand¹⁴⁷_{Sept.} communicated to the California Academy of Medicine a reaction with glymol, accidentally discovered. The observer had occasion to color some specimens by Grammure's method, and during his work he noticed a peculiar reaction. When to a solution of iodide of potassium were added a cubic centimetre (15 minims) or so of nitric acid and the same quantity of chloroform, he obtained a pinkish-colored zone at the bottom of the test-tube. The same reaction was observed when

to the solution of potassium iodide was added a little glymol; but in this instance the color zone, instead of the bottom, appeared at the top of the test-tube. Hildebrand did not attempt to explain this phenomenon.

Hydraulic Pressure, Effects of, upon Animal Tissues and on Vital Hydration.—Benjamin Ward Richardson³⁸_{21q} has undertaken an experimental research upon the above subject, with the special object of ascertaining what would be the effect of extreme pressure on muscular and nervous tissues. One experiment each was performed to show the effect of hydraulic pressure on (1) muscular substance; (2) muscle after partial desiccation; (3) cerebral substance; (4) mixed muscle and cerebral substances; (5) muscular substance mixed with oxygenated blood; (6) muscular and nervous substances mixed with blood charged with carbonic acid; (7) nervous substance mixed with oxygenated blood; (8) nervous substance mixed with blood charged with carbonic acid; (9) muscular substance mixed with sodium chloride. From the experimental results obtained, it is inferred that in their natural state the muscular and nervous tissues are, like water itself, practically incompressible and rigid; that is to say, those tissues are hydrated until they are free of risk of compression by any power of pressure which the force of the circulation can put upon them. It would seem from the research, as so far carried on, that the only mode in which the brain in its closed cavity of the skull could be influenced by pressure of the blood would be by irregularity of pressure; that is, if the uniformity of pressure were broken, as by the rupture of a cerebral vessel, then, under interruption of even pressure at the injured part, natural function might be locally disturbed, but not elsewhere. The results indicate the peculiar character of hydration of colloid substances. Graham, some time ago, stated that the hydration of a colloid ought to be looked upon, physically, as a simple process of dilution. The author of the present research believes that interpretation to be the true one; and yet, strangely, the very dilution may be accepted as a process of solidification of water itself. He refers to this experiment: a firm portion of jelly-fish, which weighed 10,000 grains (640 grammes), yielded, on complete desiccation, a little under 10 grains (0.64 gramme) of solid material. A similar kind of relationship obtains in the semi-solid masses of fibrin which are removed, in some cases, from the

heart and great blood-vessels. The puzzle is, how water can solidify into firm, colloidal matter, so as to constitute mass. Hydration is not saturation, like the saturation of a sponge; it is a veritable combination, and yet by evaporation the water can be withdrawn. It is peculiar, too, that when colloids have become hydrated and have rendered water semi-solid they can, by some contractile act of their own, make water exude from them; although, under such intense compression as was seen in the experiments described, there is no exudation. The last experiments, in which the effects were shown of addition of saline matter to colloidal matter, are, perhaps, the most important of all. They indicate the value of saline substance in excretion; they indicate a service which has not been before considered in relation to excretion and in relation especially to the value of the salt of the urine,—urea. *In the absence of urea, there could be no excretion of urine. Conversely, in the pressure of an excess of urea or of any soluble salt, such as sugar, there must be an excess of excretion.* Urea is the salt that takes up the water from the colloidal substance of the kidney, fixes the water, and escapes with it. Reduce the natural quantity of urea, and, in proportion, the power of the pressure of the circulation to excrete urine is reduced. Increase the quantity of urea above the normal, and albumen will pass over with the excretion and albuminoid urea will charge the blood. A continuation of this beautiful and important study is promised at an early date.

Iodates.—The physiological action of the iodates has been the subject of a study by Louis Lapicque.³¹
Feb. 11 His experiments were performed on curarized dogs kept alive by artificial respiration. The observer found that the iodate of sodium or potassium, in 5-per-cent. solution, in doses of 10 centigrammes ($1\frac{1}{2}$ grains) per kilogramme ($2\frac{1}{2}$ pounds) of the animal's weight, produced an immediate fall of the arterial pressure, similar to that caused by the iodide, in the course of one hour. The reduction by the iodate is produced in about five minutes. The heart becomes accelerated and irregular, as in the case of the iodide. The pneumogastries, the vasomotor system, and the nerve-regulating apparatus of the circulation retain their excitability as if under the influence of the iodide.

Iron.—A very interesting research on the toxic action of iron

on the animal organism has been published by I. Wojtaszek.<sup>569 19
Nos. 5, 7; Aug. 20</sup> From the results obtained, in a series of experiments performed upon the lower animals, the author concludes that iron may act toxically only when it is injected into the blood or hypodermatically. The action is chiefly manifested by paralysis of the central nervous system, preceded by a period of irritation. The drug produces death by asphyxia, the result of a direct action on the respiratory centre. When the drug is administered subcutaneously for a long time, inflammatory changes are produced on the kidneys, and the author infers by analogy that the same changes are operated upon man. The neutral preparations of iron are said by the writer not to produce symptoms of poisoning, and he further believes that iron does not act upon the muscular tissue of the heart. When hæmorrhage occurs from the abuse of the drug, such may depend, as has been asserted by Scherff, not on the greatly increased arterial pressure, but on the return of this to the normal state after the disappearance of the morbid processes.

Kreatin.—A careful study of the action of kreatin in normal and in tuberculous animals has been made by William S. Carter.<sup>80
Aug.</sup> The author details several experiments. From the results obtained, it appears, according to the writer, that kreatin has no action on tuberculous animals. The doses given were larger than those given by two previous investigators, Dixon and Zuill. These authors did not report in detail their experiments with kreatin, but in those made with tannin they state that the injection was made in the morning, and that in every case the rise in temperature occurred from 7 to 9 in the evening. It is well known that there is a diurnal change of temperature in normal animals, the minimum occurring in the morning and the maximum at about 4 or 5 in the evening. The temperature remains high until 9 in the evening, from which time it falls until morning. In tuberculosis, especially if the disease is advanced, there is often a pronounced elevation of temperature. Carter, therefore, contends that, from the conclusions arrived at by Dixon and Zuill, it would seem that, at the time of writing their paper, they had not taken into consideration this diurnal change in temperature which occurs in animals, and mistook the normal evening rise of temperature for a reaction. In the experiments of Carter the injections were made in the evening, and it was found that with kreatin there was no change of

temperature, but with tuberculin there was a distinct reaction, at a time when the temperature would normally be falling,—a fact that is of great significance.

Laudanine.—Fubini and Benedicenti^{477 589}_{Dec., '91 ; Feb. 16} have instituted a series of experiments with this drug. Laudanine is a substance which crystallizes in long prisms, soluble in benzin, chloroform, and boiling alcohol. It is insoluble in water, and forms salts with the acids. For experimental purposes the authors used a solution of the drug in olive-oil. In this form it was rapidly absorbed, especially from the peritoneal cavity. In mammals, the chief symptoms produced were tetanus, followed by paralysis. In frogs laudanine slowed the heart-beats and the movements of the cilia of the lingual epithelium. In dogs it paralyzed the inhibitory fibres of the pneumogastric nerves, and from other experiments the results showed that laudanine acts chiefly upon the spinal cord. The drug is particularly poisonous to young animals.

Medicinal Principles or Organic Bodies, Relations between their Chemical Composition and their Physiological Action.—A study of this subject has been made by E. Poulsson.^{369 996}_{No. 7, p. 613 ; Sept. 10} The author has investigated morphine, but has not arrived at definite conclusions. He points out exceptions to the general rule of judging the physiological action of an organic body from its constitutional composition; it is not sufficient, he contends, that certain elements or groups of atoms be found in the molecule; it is necessary, also, that they be disposed among themselves by a determined geometrical plan. In one word, the author believes that the power of the physiological action increases proportionately to the atomic weight.

Mercury.—Pilliet and Cathelineau⁷_{No. 21} have carried on a series of experiments in order to study the post-mortem lesions caused by the bichloride of mercury. The results were obtained from eight experiments carefully performed in animals in which death was produced by the minimum fatal dose of the drug. The animals comprised six dogs and two rabbits. The medicament was administered by the stomach, by intra-muscular injections, and especially intra-venously. The lesions caused were marked and practically alike in the two different species of animals used. Death was produced in from one-half day to four days. The chief lesions were as follow: *The kidneys*: These exhibited a special alteration of

the secretory epithelium of Heidenhain, and such alteration manifested itself in three stages: In the *first*, the tubular cells retained their striæ, but their marginal portions were replaced by vacuoles, the excretions of which filled the uriniferous tubules with hyaline casts. In the *second*, these phenomena disappeared and many of the desquamated cells filled the lumen of the tubules, and a second variety of casts made their appearance, being granular and not hyaline, as in the first instance. In the *third*, there was a condition of excessive distension of the secretory cells, observed especially along the loops, the cells appearing tumefied and the tubules distended with polygonous elements which effaced the lumen of said tubules; the cells lost their natural contour and appeared as polyhedral vesicles by reciprocal pressure. Finally, in a *fourth* stage, all these cells disappeared as if swept away by the current of the blood, and expelled, leaving the connective tissue of the kidney with the glomerules slightly inflamed. Outside of this epithelial inflammation, which may be summed up in three words,—*hypersecretion*, *necrosis*, and *elimination*,—there occurred a decidedly intense congestion, and hæmorrhage in the glomerular cavities, especially in the tubules of Bellini, which were literally distended with blood-red cells. *The small intestine*: The cæcum exhibited large ulcerations; the mucous membrane a congestive condition, particularly its free surface, which was covered with bloody extravasation. The villi were filled with red corpuscles, and here was observed the beginning of glandular changes. The glands of Lieberkühn were also invaded by red cells deprived of their hæmoglobin. The glandular epithelium exhibited a cystoplasmic striated appearance similar to that observed in the secretory cells of the kidneys. The changes were such that in certain places the cylindrical could not be distinguished from the calciform cells. *The large intestine*: Eschars were found as the result of an extreme congestion of the vascular net-work of the mucous membrane and a necrosis of the glandular epithelium. In many places the epithelial cells were entirely destroyed, there having been nothing left but the connective tissue of the glands. *The liver*: Similar lesions were met with in this organ: tumefaction and necrosis of the cells, accompanied with the disappearance of the parenchymatous elements, leaving behind only the connective tissue. *The heart*: In this organ ecchymoses were found in the

endocardium, together with marked alterations in the cardiac muscular fibres. *The spleen*: An intense congestion of this organ, particularly of its venous pulp, as met with. Karl Ullmann, ⁵⁷ Sept. 25 in studying the sequelæ from the administration of the insoluble salts of mercury, states that the metal may be found deposited in the tissues in the order in which they are here mentioned, those organs containing the larger amounts being as follow: kidneys, liver, spleen; then the intestinal canal (which contains an increasing portion from the upper part downward), and in small amounts in the heart skeletal muscles, and, in some cases, in the lungs and in the blood collected in the larger vessels and the aorta.

Monomethylamine.—Combemale and Brunelle ^{181 151} May 13, July have studied the physiological effects of this substance. Monomethylamine is a gas having a formula of $\text{NH}_2(\text{CH}_3)$. At a few degrees below 0°C . (32°F .), it is said to become a liquid with an ammoniacal odor; it is strongly alkaline and gives off white fumes in presence of hydrochloric acid. The authors instituted a series of experiments on dogs, injecting the drug under the skin. Their results are as follow: (1) injected subcutaneously, the gas (it was employed in solution) produces phenomena of irritation, going on even to necrosis; (2) internally, after absorption, there is a tendency to hæmorrhages, renal, pulmonary, cardiac, and intestinal. There are fluctuations of temperature, sialorrhœa, and albuminuria. These effects, however, according to the authors, are prevented by administering a solution not stronger than 1 in 200. The dose per kilogramme ($2\frac{1}{2}$ pounds) of the body-weight should not exceed 10 centigrammes ($1\frac{1}{2}$ grains). Beyond this amount, death is invariably produced.

Nuclein.—It is stated in a correspondence ⁶ Aug 20 that by the recent researches of Horbaczewski, of Prague, a new substance has been added to the number of lymphagoga. In the course of his researches on the origin of the uric acid in mammals, Horbaczewski made the interesting discovery that leucocytosis was increased in the animals by the injection of nuclein. Further experiments proved that nuclein could be administered in man, in doses of from 5 to 10 grammes (75 to 150 grains), without causing any evil effects. It has now been proved by recent experiments that inflammatory processes going on in the organism are considerably augmented by the injections of nuclein. The nuclein employed by Horbaczewski

was prepared from the pulp of the spleen of calves, which had been subjected to digestion by pepsin and hydrochloric acid and subsequent depuration.

Opium.—In experimentally studying the action of morphine upon the brain, Kraepelin,⁵⁸⁹_{July 11}²_{Aug. 27} has found that the alkaloid causes at first an enormous excitation of the sensory function and a subsequent marked and rapid depression of the same; that it produces a decided and persistent paralysis of the motor functions.

Oxalic Acid.—O. Loew³⁴_{Aug. 9} publishes the results of a series of experiments upon the action of oxalic acid upon the lower forms of animal and vegetable life. In a general way soluble oxalates may be said to be poisonous to these classes of organisms. For the lower forms of animal life the oxalates are decidedly poisonous, but there are marked differences in their action upon the different forms, some of these being killed more quickly than others. These salts are decidedly poisonous to the higher orders of plants, portions of stalks and leaves quickly wilting and dying from the action of the oxalate upon some of the cell-constituents, probably by the removal of the calcium which is in combination with nuclein in the nucleated chlorophyllous bodies in green plants. They have no action whatever upon the fungi; and even in their effects upon animal cells and the higher plants, dilution rapidly diminishes their deleterious power.

Paraldehyde.—According to Kraepelin,⁵⁸⁹_{July 11}²_{Aug. 27} who has made a special investigation on how drugs act on the brain, it is affirmed that paraldehyde causes difficulty of the sensory functions and aids the motor processes, and, finally, paralyzes the latter ones.

Pental.—In connection with their research on chloride of ethyl,⁸⁰⁵_{June} Wood and Cerna made a similar preliminary study⁸⁰⁵_{June} regarding the action of pental. The results of their experiments appear to show that pental, as an anæsthetic, acts quickly and fugaciously, but that it will probably be found more dangerous than the chloride of ethyl, and much more dangerous than chloroform. Thus, each time anæsthesia was produced by the drug there was a marked fall of arterial pressure. In each anæsthetization the respiratory rate was increased, although the extent of the respiratory movements, most of the time, were not distinctly above the normal. In one case, the authors observed that the heart was at once affected much more severely than the respiratory centres;

that it failed to recover itself before the arrest of respiration; indeed, full inspiration occurred half a minute after complete cessation of the circulation. In no instance was death caused by the inhalation of pental. Wood and Cerna conclude, finally, led by the results of their experiments with this new anæsthetic, that pental will probably prove to be dangerous, and, if extensively used, will cause death by cardiac arrest; and that it is probable, also, that the after-effects of pental, in the human being, would be disagreeable, as they repeatedly noticed in the dog a peculiar wild excitement after the anæsthesia from pental had passed off.

Phenacetin.—Without forgetting the studies of Hinsberg and Kast, and particularly the more extensive ones of Hare, no thorough investigations have been made in regard to the action of phenacetin on the circulation, if we except the research of David Cerna and William S. Carter, published last year, and which we are about to notice.⁸²⁶ The authors not only studied the action of phenacetin on the circulatory apparatus, but also its influence on heat phenomena. Taking the two chief points of the research, *seriatim*, the circulation will be considered first. *The blood-pressure:* The writers performed several experiments with a view to ascertain the actions of the drug on blood-pressure and pulse in normal animals. The most striking of said experiments are detailed, four in number, and they found that in two of them, in which comparatively moderate quantities of phenacetin were employed, the arterial pressure was increased. In the other two instances, in which larger and toxic amounts were ingested, the pressure was notably decreased, and so continued till the final fatal effect. The lethal dose of phenacetin, intra-venously injected, the authors found to be about 0.26 gramme (4 grains) per kilogramme (2½ pounds) of the body-weight, and they make such inaccurate statement from the fact that the substance is quite insoluble. The results of the experiments performed in curarized animals showed that, under such circumstances, the drug was able to elevate the arterial pressure. Furthermore, an increase of pressure was observed in dogs whose pneumogastrics had been previously divided. Again, in animals in which the spinal cord and the vagi had been severed beforehand, thus cutting off all nerve-supply to the heart, with the complete production of vasomotor paralysis, phenacetin was no longer able to produce a rise of the arterial pressure. The fall which the drug caused

under such circumstances was recovered from in the course of a few minutes, but the pressure never went beyond the normal point. These statements are well sustained by the experiments, which are given in tabular form, and also by the tracings reproduced from the original. A study of the results alluded to, with the significant fact that the rate of the pulse and the column of mercury representing the arterial pressure ran a similar course,—that is, increasing and diminishing together,—would seem to show that both the rise and fall of the arterial pressure are mainly of a cardiac origin. On the other hand, however, the failure of phenacetin to elevate the pressure after section of the spinal cord would indicate that in part, at least, the drug exercises, in normal animals and under moderate amounts, a stimulating influence on the vasomotor system. The authors believe that the fall of pressure produced by the remedy in large or toxic doses is due chiefly to an action upon the heart. *The pulse*: Phenacetin, although in an irregular manner, tends to produce an increase in the rapidity of the pulse. This rapidity is followed by a decrease in rate, though the force is sometimes manifestly increased, as is attested by the large size of the individual pulse-waves, especially when larger amounts of the drug are administered. After the vagi have been previously divided, the increased pulse-rate persists, but no secondary diminution is observed, unless very late in the poisoning, when overwhelming quantities of the drug have been ingested. The authors believe, then, that small or moderate doses of phenacetin increase cardiac action by influencing the heart itself, and that large amounts stimulate the cardio-inhibitory apparatus and thus cause a reduction of the pulse-rate. Cerna and Carter contend, however, that the inability of the drug to produce the usual increased pulse-rate after the heart has been deprived of all its nerve-supply, as is noticed in the example given, would seem to raise the question as to whether another factor must be taken into consideration for the explanation of the first result; that is, as to whether the drug, besides acting upon the heart itself, also stimulates the cardio-accelerating nerve apparatus. It is so difficult to decide positively how drugs influence, if they do at all, the accelerating centres, owing to the passive condition of these as regards activity, that the authors have deemed it wise to leave the point at issue in *statu quo*. There appears to be no doubt, however, that phen-

acetin in large quantities reduces the pulse-rate by a double action, —stimulation of the cardio-inhibitory centres and, later, depression of the heart itself. *The blood*: Cerna and Carter were unable to notice any action of phenacetin upon this tissue, as claimed by other observers, who have stated that the drug changes the hæmoglobin into methæmoglobin. *The respiration*: Ordinary amounts of phenacetin produce no effect, but large quantities cause a marked quickening of the respiratory movements. As the same results were obtained after previous section of the vagi, the writers assume that phenacetin influences the centres in the medulla oblongata directly. In summarizing their interesting study with phenacetin, Cerna and Carter formulate the following conclusions in regard to the action of the drug on the circulation: (1) phenacetin, in moderate doses, causes a rise of the arterial pressure by acting upon the heart, and, probably, likewise by a stimulating influence exercised on the vasomotor system; (2) the reduction of the pressure by the drug in large amounts is mainly of cardiac origin; (3) the remedy increases in small doses the force of the heart by a direct action; (4) phenacetin increases the pulse-rate chiefly by cardiac stimulation, and, possibly, also, by influencing the cardio-accelerating apparatus; (5) the drug reduces the number of pulsations, especially in large quantities, primarily by stimulating the cardio-inhibitory centres, and, later, by a depressant action upon the heart.

Regarding the action of phenacetin on heat phenomena, Cerna and Carter found that the drug produces in normal animals practically no changes. There was a slight fall of temperature the third hour after the drug was given to the animals, but so slight that it could not be said to be due to the action of the remedy. In the fever experiments, the authors state that fever, under the influence of putrid blood, was produced by an increase of heat dissipation. On the second day they noticed, in the average of the results, a decrease of ten heat-units in the heat production during the first hour after the administration of the drug by the stomach. The temperature, however, did not fall much until the third hour; and the heat production reached the minimum at that time. The heat dissipation was very slightly affected. From such results it would seem, according to the authors, that phenacetin does not act as promptly as antipyrin, and that it causes a fall of temperature by

producing a diminution of heat production. In order to see whether phenacetin would act differently in a fever produced in another manner, the investigators injected albumose in several experiments. It was found also that albumoses produce fever by a rise of heat production, and that phenacetin keeps the temperature from rising to the height attained during the first day, by diminishing the heat production. The heat dissipation was not affected by the drug. The authors, finally, conclude: *Phenacetin, both in septic and albumose fevers, produces a very slight fall of temperature during the first and second hours after its ingestion by the stomach; but the greatest reduction occurs the third hour after its administration. The fall of temperature results chiefly from a decrease in heat production, with a slight increase in the heat dissipation. The increase in dissipation is not so great as with antipyrin. Probably the delayed action of the drug depends on its insolubility.*

Phenocoll.—This substance is a derivative of phenacetin, and is prepared from the interaction of para-amidophenotol (phenetidin) and amido-acetic acid (glycocoll). It occurs in the form of a white, crystalline powder and is soluble in water at a temperature of 62° F. (16.66° C.), in the proportion of 1 to 16 parts. For experimental purposes David Cerna and William S. Carter^{Sept. 26} employed the *hydrochloride*, the salt mostly used in practical medicine. The authors made an elaborate study of the action of phenocoll on the circulation and on heat phenomena. It is the only investigation upon the subject that has appeared so far. In regard to the first portion of their study, Cerna and Carter found, as the result of their numerous experiments, that the action of phenocoll upon the circulatory apparatus, unless the drug is given in enormous amounts, is not a marked one. The authors believe that in ordinary medicinal quantities phenocoll exercises, if at all, a slightly stimulating influence. The following are some of the most striking experiments detailed by the authors: *The blood-pressure:* For experiment 1, a dog weighing 10.231 kilogrammes (25½ pounds) was used. The solution of phenocoll employed was of the strength of 4 per cent. After the first injection of 12 cubic centimetres (3 drachms) the pressure fell, but soon returned to the normal point. The same result was noticed after the second dose of the same amount. Under a third dose of 20 cubic centimetres

(5 drachms), injected seventeen minutes afterward, the pressure was reduced, and continued to go down till the occurrence of death. The respiration was comparatively unaffected, but somewhat shallow and diminished in frequency. The temperature was lowered only just before death. No change was observed in the character of the blood. Death was produced by respiratory failure. Another experiment, made under similar conditions, gave similar results. For a third experiment a dog weighing 15.2 kilogrammes (38 pounds) was used, and the solution employed of the strength of 1 per cent. An injection of 20 cubic centimetres (5 drachms) caused a momentary fall of pressure, which was soon recovered from. The column of mercury was then raised above the normal height, so that about one and one-half minutes after the second dose of the same amount the pressure marked 170 millimetres, the normal being 140 millimetres; it remained above this point under subsequent injections, but finally fell under three doses of 10 cubic centimetres ($2\frac{1}{2}$ drachms) each of a 4-per-cent. solution. At the time of the stoppage of the respiration the needle of the manometer marked 230 millimetres, this perhaps, according to the authors, being due to asphyxia. The temperature fell 0.1° C. ($\frac{9}{50}^{\circ}$ F.) after 50 cubic centimetres ($12\frac{1}{2}$ drachms) of the 1-per-cent. solution had been ingested, but it went back to normal, and even rose above the normal point before death; the animal died from respiratory failure. The action of phenocoll upon the arterial pressure, in medicinal doses, although slightly stimulating, is, according to Cerna and Carter, practically unimportant. The more marked effect, especially when comparatively large quantities are ingested, is that of depression, such phenomenon occurring similarly not only in curarized animals, but also in those in which section of the spinal cord and the pneumogastriacs has been practiced beforehand. Such results, and the significant elevation of the reduced pressure by asphyxia, as observed in one of the experiments described, all would seem to show, in the opinion of the writers, that the vasomotor system is not influenced by the drug.

The pulse: The heart-beat in the normal animal was at first diminished, the reduction being generally followed by an increase above the original rate. The same result was noticed in curarized dogs. The rapidity of the pulse was prevented by previous section of the vagi and of all nerves supplying the heart. The authors

infer, from such results, that the primary reduction of the pulse-rate is due to stimulation of cardio-inhibitory centres; the secondary quickening, to paralysis of the same. They found this assertion sustained by the fact that electrical irritation of the central end of a vagus, under the full influence of the drug, produced no effect. The authors hold, again, that the final diminution of the pulse-rate, which was often accompanied by a marked increase in the size of the pulse-waves, may be due to an action upon the heart itself. As regards *the blood*, Cerna and Carter could not observe any change brought about by phenocoll. The authors give the following *résumé* of their conclusions: 1. Phenocoll, in ordinary amounts, has practically no effect upon the circulation. 2. Large doses diminish the blood-pressure by influencing the heart. 3. Phenocoll reduces the pulse-rate by stimulating the cardio-inhibitory centres. It then increases the rapidity of the pulse by paralyzing said centres. The final diminution is of cardiac origin. 4. Upon the blood itself phenocoll has no action.

In their investigation with phenocoll on heat phenomena, an examination of their experiments shows that in normal animals the drug exercises no effect on the heat functions. There was observed a slight fall of temperature at the end of the experiments, but so slight that it was probably due, according to the writers, to the circumstance of the animals being kept in the calorimeter for several consecutive hours, and not to the action of the drug. The experiments on fevered animals show a decided action of phenocoll on the animal temperature. The fever was produced, as in the case of antipyrin and phenacetin (*q. v.*), by an increase of heat production. The diminution of heat dissipation with the beginning of the fever in these experiments was caused, as is noticed in one of the experiments, by unusual results. On the second day there was an enormous rise of the heat production with the introduction of putrid blood. The next hour after the administration of phenocoll by the stomach the temperature fell almost to the normal, and continued falling during the rest of the experiment. This fall of temperature was caused by a corresponding diminution of heat production. The heat dissipation was not affected. From the results of their exhaustive experimentation, the authors conclude as follows: *Phenocoll causes in fever a very decided fall of temperature, which occurs the first hour after the administration*

of the drug by the stomach. This reduction is the result of an enormous diminution of heat production, without any alteration of heat dissipation.

Phosphorus.—The influence which cerebral activity exercises on the assimilation of phosphorus has been made the subject of a special experimental study by Alexander Chtchebrak. ^{2005 152} ^{90 ; Apr. 28} The results obtained by the investigator are of much interest. Three series of experiments were undertaken by the author: 1. In regard to the influence exercised by healthy brains. 2. Regarding the influence exercised by slow or comparatively non-active brains, such as those of imbeciles or idiots. 3. In reference to that exercised by brains of animals under the action of morphine. As a result of these experiments, the author, in general, found that excessive cerebral action,—that is, intellectual overwork,—produces, other things being equal, an increase in phosphorus waste; that these effects are not observed as the result of physical overwork, nor as that of a moderate mental activity; and that in microcephalous subjects the quantity of phosphorus assimilated is quite small, fixed, and is not modified by the amount introduced with the food. In healthy man the quantity of phosphorus assimilated is larger by far than in microcephalous individuals, and it varies daily in quite appreciable proportions. For the purpose of ascertaining the part taken by the cerebral substance in the assimilation of phosphorus, the author instituted another series of experiments, in which he not only studied the action of morphine on the cerebral circulation, but also the amount of phosphorus which, under such conditions, would be found in the blood traversing the brain. The investigator observed that the first action of the drug in question was to increase the rapidity of the cerebral circulation followed by a diminution. This diminution lasted from one to two hours after the ingestion of large doses; with small quantities the circulation soon returned to normal. The increase in the rapidity of the circulation, which was accompanied by a rise of the arterial pressure, is due to an increase of the heart's action, brought about by paralysis of the cardio-inhibitory apparatus, there being also a reflux of the venous blood. The diminution of the arterial pressure and the venous reflux (a cerebral ischæmia), occurring in from thirty to forty seconds after a subcutaneous injection of morphine, is due partly to weakness of the heart, partly to contraction of the

cerebral vessels. The examination for the phosphorus was made in the blood of the carotid artery; for that of the venous in the jugular. In normal conditions the phosphorus found in venous is less than that found in arterial blood, the difference varying from 0.08 to 0.09 per 1000. In natural sleep the proportion is 0.110 per 1000; in narcotic sleep, 0.086 per 1000, which is, to say the least, a marked difference. The author affirms, from the foregoing research, that in man the assimilation of phosphorus is subject to modifications, it being increased in relation to cerebral activity; that in microcephalic, idiotic individuals, the quantity of phosphorus required is less than in normal persons; but is, on the other hand, more stable and more constant; and, finally, formulates the following conclusions: 1. The modifications in the assimilation of phosphorus can only occur in the two extreme conditions: on the one hand, under the influence exercised by increased, continuous intellectual work; on the other, the lessened mental activity of idiotic brains. 2. Moderate intellectual work, or a feeble work, as in the case of weak, imbecile brains, does not modify the assimilation of phosphorus.

Pilocarpine.—This drug, according to the special researches of Maurel,⁶⁷_{Apr.15} in doses of 10 centigrammes ($1\frac{1}{2}$ grains), was able to destroy the leucocytes contained in 100 grammes ($3\frac{1}{3}$ ounces) of human blood; in doses of 5 centigrammes ($\frac{3}{4}$ grain), the leucocytes contained in the same amount of blood could only live a few hours. Comparing these results with those obtained with atropine in a similar investigation (and the reader is referred to the paragraphs on atropine in the present article), and from the results of other experiments, the author arrives at the general conclusion that both drugs are antagonists, the one to the other, and that this antagonism depends on their action upon the leucocytes; further, that the death or alteration of these elements, under the influence of both alkaloids, plays a certain part in the poisoning by these agents. In a series of experiments, J. Horbaczewski²¹⁶⁴_{V.100, Ser. 3, p.101; Sept.20}¹⁰³⁵ has found that the hydrochlorate of pilocarpine produces, in man, an increase in the number of leucocytes in the blood, and a correlative increase in the quantity of uric acid. These results were obtained in four cases observed. In three cases the drug was administered by the mouth, in doses of 1 centigramme ($\frac{1}{6}$ grain), and in the fourth, also ingested in the same manner, in quantities

of $1\frac{1}{2}$ centigrammes ($\frac{1}{4}$ grain). Continuing his experiments upon the lower animals, the author found that pilocarpine, hypodermatically administered in doses of from $\frac{1}{2}$ to 3 centigrammes ($\frac{1}{12}$ to $\frac{1}{2}$ grain) per kilogramme ($2\frac{1}{2}$ pounds) of the body-weight, only produced an increase in the size of the spleen. This result is the more remarkable since pilocarpine is an excitant of the contractile elements of the muscular fibre; and we know that it has a similar action on the intestinal walls, causing a constant diarrhœa. Horbaczewski calls attention to the contrast existing between the effects produced by quinine and those caused by pilocarpine. Quinine, without influencing the contractile elements at all, diminishes the volume of the spleen; while pilocarpine, acting on these contractile elements, produces an increase in the size of the organ. The observer believes that these changes in the spleen, caused by the two medicaments, occur independent of any action exercised by the drugs on the contractile elements of the organ.

Poisons, the Actions of, on the Excitability of Muscles and that of Peripheral Nerves.—Grigorescu,³_{Sept. 7} in studying this exceedingly interesting subject, has made a comparative graphic analysis of the physiological action of toxic agents on the excitability of the sciatic, the gastrocnemius, and of the sensibility of the corresponding parts in the frog. The substances were administered hypodermatically and in maximum doses. The author found that, under the influence of a prolonged induced current (of an intensity sufficient to produce a single muscular contraction successively in the three systems indicated), the toxic agent produced two fundamental groups of phenomena: the one group, identical curves by the three systems (concordant); and the other, variable curves by the three systems (discordant). The substances characterized as discordant exhibited five principal types of phenomena: (1) much diminished muscular excitability and retention of excitability by the motor and sensory nerves (papaverine, solanine, and butylchloral); (2) greatly diminished excitability of the nerves, that of the muscles remaining intact (curare, strychnine, and thebaine); (3) suppressed sensory excitability, diminished muscular excitability, but intact that of the motor nerves (opium and narceine); (4) diminished muscular excitability, sensory excitability intact, and that of the motor nerves increased (codeine); (5) diminished muscular excitability, that of the motor nerves intact, and that of

the sensory nerves increased (daturine, etc.). If, contends the author, these concordant and discordant phenomena represent true characters of the physiological action of poisonous drugs, placing together two of these substances having discordant action should bring about a reciprocal antagonism and neutralization of the toxic effects. This principle has been verified by the experiments of the author, particularly in the case of butyl-chloral and strychnine, which possess discordant properties. Frogs poisoned by strychnine, in doses of 1, 2, and 5 milligrammes ($\frac{1}{64}$, $\frac{1}{32}$, and $\frac{1}{16}$ grain), have recovered when treated by this new method. So that, if further experimentation should continue to verify the general principle indicated by the researches of Grigorescu, a new field will have been opened to the study of the physiological action of medicinal substances; and the physiological classification of such substances and toxicology will have to undergo fundamental modifications.

Potassium.—According to our correspondent from Warsaw, Drzewiecki, Rozkow ⁵²⁰_{July 29} instituted a series of experiments to study the action of the potassium salts on nerves and muscles. The investigator appears to have proved that under the influence of the potassium salts the muscle of the heart is attacked first, and that the left sooner than the right side of the organ. The salts kill by a cardiac arrest, since the respiration only becomes affected toward the last. The pneumogastric is stimulated so far as its influence on the stomach and bowels is concerned, and the effects produced were of such a character as to show that the vagus should be considered as the chief motor nerve of the stomach and intestines.

Protoveratrine.—Salzberger ²⁷³_{II 5,6,p.440} has isolated from the root of *Veratrum album* the principal alkaloid in crystalline form, and named it *protoveratrine*, having a chemical composition of $C_{32}H_{51}NO_{11}$; it differs from veratrine ($C_{32}H_{49}NO_9$) only by the addition of H_2 and O_2 to the latter. According to the investigations of Thomas Watts Eden, it is, however, five times more poisonous than crystalline veratrine, especially in the case of puppies. As to its influence upon muscle, the peculiar lengthening of the descending branch of the muscle-curve is wanting when protoveratrine is used. A further difference between these alkaloids is marked by the intense local anaesthesia produced by protoveratrine, which persisted for forty-eight hours when tested in the eye of an animal, and was

associated with myosis; protoveratrine has, too, a decidedly paralyzant action upon the cardiac fibres of the vagus nerve. In its general action upon frogs, as well as upon warm-blooded animals, the first manifestations are disturbances of the respiration; in the latter these increase until the fatal termination, accompanied by choking and vomiting. Frequently violent spasms occur, apparently originating in the cerebellar centres. The spinal reflex phenomena in the frog are quickly exhausted. The characteristic action of the drug upon muscles is pronounced, from the fact that the latter become exhausted more rapidly after repeated wrenchings than do normal muscles, and that a tendency to contractures soon shows itself. The ability of the muscle to accomplish work is, at the beginning of the experiment, increased, but afterward shows a marked and rapid diminution. When symptoms of poisoning appear, the peristaltic movements of the frog's heart are full; and, just as in the case of the administration of veratria, there may occur a double auricular and one ventricular contraction. Large doses quickly stop the heart in systole. In warm-blooded animals, circulation experiments showed that when the vagus nerve is intact after small doses a decrease of pressure occurs, which may return, however, from a reflex excitement of the depressor nerve; that by small doses the inhibitory fibres of the vagus are unaffected, but by large quantities are decidedly paralyzed. The accelerator fibres first lose their excitability from large doses. In the latter stages of the poisoning there seems to be a direct action upon the heart-muscle, judging from the irregular and long cardiac diastoles. Upon the body-temperature protoveratrine produces, in puppies, a decided influence only when given in doses productive of general poisoning. The clinical employment of *veratrum viride*, which for sixty years has been used as an antipyretic, and which contains protoveratrine in marked quantities, is shown, by these results of Eden, to be injudicious and dangerous.

Quinethyline.—Laborde ³_{July 6} has communicated to the Société de Biologie the results of a study of this drug, obtained from some species of cinchona. The sulphate of quinethyline was found to be less soluble than the cupreine hydrochlorate (*q. v.*), and with properties, although feebler, resembling those of the latter substance.

Quinine.—An excellent contribution to the study of the

action of quinine on the excitability of the nervous system and of the muscles, and also on the influence exercised on the mechanical work of these latter tissues, has been published by C. G. Santeson.^{370 996} According to this investigator, quinine paralyzes the spinal cord directly, independent of any simultaneous paralysis of the heart and depression of the circulation, while the irritability of the peripheral nerves and muscles remains intact. This result seems to show that the action of the drug is not very energetic. The property of the muscles for mechanical work is considerably increased, and upon frogs and rabbits it has been demonstrated that such increase is essentially due to a direct action of the poison upon the muscular substance, especially in the case of the frog. However, the muscle poisoned by quinine is sooner fatigued than the normal muscle, and it easily assumes a condition of rigidity,—a rigidity resembling that occurring in a muscle that has been previously fatigued by overwork. Upon rabbits there is produced an increase of the muscular work, independent of the circulation in the muscle. The salts of quinine give, with chlorated water and ammonia, a green coloration changed to a red hue by a mineral acid. This reaction, however, does not always occur. According to Schweiz,^{1036 996} it will never fail if the following method is employed: Mix in a tube 5 centigrammes ($\frac{3}{4}$ grain) of a quinine salt, 10 centigrammes ($1\frac{1}{2}$ grains) of hypochlorite of lime, 10 cubic centimetres ($2\frac{1}{2}$ drachms) of water, and 20 drops of dilute hydrochloric acid. Shake and fill up to 200 cubic centimetres ($6\frac{3}{4}$ ounces), then add slowly 5 cubic centimetres ($1\frac{1}{4}$ drachms) of ammonia. The green coloration follows, and, in the course of a few minutes, it attains its maximum of intensity. A mineral acid changes it to red. With the tannate and the ferro-citrate of quinine the red hue is obtained without the production of the green coloration. In operating a reaction with acetic acid and bromated water (1 to 2 drops) there is obtained, on the addition of ammonia, the green coloration with a bluish tint. All the salts of quinine will respond to this reaction, but those of cinchonine and cinchonidine will not.

In an experimental study of the actions of quinine on the leucocytes, E. Maurel,⁹⁹⁶ employing the hydrochloride, observed results which are embodied in the following conclusions: 1. Hydrochlorate of quinine, in doses of 1 gramme (15 grains) per 100

grammes ($3\frac{1}{3}$ ounces) of blood, kills immediately the leucocytes and alters the red blood-corpuscles. 2. It is probable that the same result may be obtained with lesser quantities of the salt, since in amounts of 0.25 gramme (4 grains) per 100 grammes ($3\frac{1}{3}$ ounces) of blood, the red corpuscles are spared, but the leucocytes lose their mobility, which, as is well known, is a sign of approaching death. 3. In doses of 0.25 gramme (4 grains) or less per 100 grammes ($3\frac{1}{3}$ ounces) of blood, the red cells are not affected, except it be in their form and aspect. 4. In doses of 0.166 gramme ($2\frac{1}{2}$ grains) the leucocytes are only deformed, but their evolution continues actively. 5. In doses of 0.10 gramme ($1\frac{1}{2}$ grains) the leucocytes may live, but they have a tendency to the spherical shape, and their evolution is equally active. 6. The same phenomena, but in a less degree of intensity, are shown in doses of 0.066, 0.033, and 0.02 gramme (1 , $\frac{1}{2}$, and $\frac{1}{3}$ grain) per 100 grammes ($3\frac{1}{3}$ ounces) of blood. 7. Doses of from 0.25 to 0.166 gramme (4 to $2\frac{1}{2}$ grains) are the limit toxic doses of hydrochlorate of quinine for the leucocytes. This latter quantity corresponds to about 10 grammes ($2\frac{1}{2}$ drachms) for a man weighing 60 kilogrammes (150 pounds). These results appear to confirm the researches of Binez, Scharrenbruch, Nothnagel, and Rossbach. 8. The toxic doses of this drug for the red corpuscles are greater than for the leucocytes. 9. The tendency to assume the spherical form, so marked in doses approaching toxicity, continues to manifest itself under purely medicinal doses of 4 grammes (60 grains), 2 grammes (30 grains), and $1\frac{1}{2}$ grammes (22 grains). 10. Febrile temperatures exaggerate the modifications of the leucocytes. 11. On the other hand, the presence of quinine in the blood increases the action of heat upon these elements. The leucocytes, which continued active during many hours in the blood at 42° C. ($107\frac{3}{5}^{\circ}$ F.), rapidly lose their activity if to that blood is added quinine in doses of 0.066 (1 grain) per 100 grammes ($3\frac{1}{3}$ ounces) of blood. 12. The administration of quinine by the stomach, in medicinal doses, may not alter these elements; but a difference must be taken into consideration, especially in regard to the soluble and insoluble salts. 13. On the contrary, a certain quantity of these cells are surely altered by the doses referred to when given hypodermatically. 14. Without establishing a relationship between cause and effect, it may be said that toxic doses for the human organism are the

same as those which are fatal to the leucocytes. 15. Finally, the constant tendency of the leucocytes to assume the spherical form, under the influence of quinine in medicinal doses, leads to this proposition: that this modification of the elements is not foreign to any of the therapeutic properties of the drug, especially the elevation of the arterial pressure and the diminution of calorification.

Quinopropyline.—This new derivative of a species of cinchona has been studied by Laborde.³_{July 6} The results of his study have been communicated to the Société de Biologie. The investigator found the drug quite active, producing a lowering of the temperature as much as 4° C. ($71\frac{1}{5}^{\circ}$ F.) in the course of an hour after its administration. The medicament also causes, according to the author, convulsant phenomena, when injected in high doses.

Salipyrin.—The action of this drug on the heart has been investigated by P. Alberto,³⁷⁶_{June 30; Aug. 20} the experiments having been performed on frogs and toads, both with the heart *in situ* and separated from the body. The results obtained by the authors show that: small doses of salipyrin act favorably upon the heart, facilitating its diastolic filling, increasing the force of the systole, and diminishing the actual rate of contractions; medium quantities produce arrhythmia; and large amounts cause diastolic arrest. The author concludes, then, that salipyrin acts undoubtedly on the heart; but whether it acts chiefly on the cardiac muscle itself or on the intra-cardiac ganglia, Alberto has not as yet ascertained.

Salol.—It has been generally held that salol, given internally, is decomposed in the organism, especially through the instrumentality of the pancreatic juice. Gley,³_{Apr. 13} in further investigating the matter, made two experiments on dogs. After extirpating the pancreas from the animals, in order to exclude the action of the juice of that organ, he gave salol, and found that the drug was eliminated by the urine in the form of phenic acid, exactly as if the remedy had been administered to normal dogs. Post-mortem examination revealed a complete removal of the pancreas. The author, therefore, concludes that salol is decomposed in the organism by other processes than the action of the pancreatic juice alone. The results of this interesting research have been communicated in full to the Société de Biologie.

Silver.—Fraschetti,⁴¹_{Aug. 22} in a report read before the Academy

of Medicine at Rome, June 26th, upon experimental investigations in relation to argyria, states these conclusions: 1. All silver preparations give rise to argyria, even to a local deposit, upon their external employment. 2. Reduction of the silver salts administered takes place in the stomach, afterward in the intestinal canal, tending to the separation of the metal. 3. Silver finds its way into the organs through the lymphatic passages. 4. It is not eliminated either by the urinary organs or by the intestines. 5. No organ is excepted for the pigmentation, save the parenchymatous cells and epithelium. 6. Argyria does not produce any serious effects in the economy. 7. The deposit of the metal takes place proportionally from the first administration. 8. The color of the skin and of the organs is caused by the metallic silver, or perhaps by the oxide of the metal.

Sodium Fluoride.—The recent investigations of Tappeinhe, in relation to the toxic action of fluoride of sodium upon animals, have suggested to O. Loew ³¹_{Aug. 16} a similar set of investigations upon the influence of the same material upon vegetable cells. From these experiments the author concludes that, at least in part, the effects of sodium fluoride are due to its removing the lime from important structures; that its influence is deleterious both to the higher and the lower orders of chlorophyllous plants, and, as Tappeinhe previously pointed out, to the bacteria of decomposition. Oxalic acid acts in a similar way upon the chlorophyllous plants, but without as much energy; they are inert, however, in their relations to bacteria.

Strychnine.—An excellent contribution to the study of the action of strychnine on the leucocytes has been made by Maurel. ⁶⁷_{Mar. 30} In his investigations the author employed the sulphate, and the results obtained in his elaborate paper are embodied in the following conclusions: 1. Five centigrammes ($\frac{3}{4}$ grain) of the sulphate of strychnine are sufficient to rapidly kill the leucocytes in 100 grammes ($3\frac{1}{2}$ ounces) of human blood, representing about 1 kilogramme ($2\frac{1}{2}$ pounds) of the body-weight. 2. Under doses of 2 centigrammes ($\frac{1}{3}$ grain) of the drug for the same quantity of blood, the leucocytes can only live a few hours, the fatal result, though tardy, being the same. 3. In poisoning by strychnine, the death of the leucocytes and that of the animal occur simultaneously. 4. Death of the elements of the blood under

strychnine is due to a direct action, and *not* to the death of the animal; since in other poisonings, notably those produced by curare and cyanide of potassium, the leucocytes survive the death of the animal. 5. In all these experiments the hæmoglobin remains unaffected, even after the death of the cells. 6. Finally, to judge from the general results obtained, especially from the simultaneous death of the animal and the leucocytes, these play an important rôle in the poisoning by strychnine.

The best contribution in the whole range of the literature of the subject, regarding the actions of strychnine, is that published last year by Edward T. Reichert.⁸⁰
Mar. to June The research is exhaustive, and the results obtained by the author are so interesting and important that we shall be obliged to quote extensively from his able paper, in order to consider the most salient points. The experimentation was specially directed to study certain actions of strychnine in *excitant* and *paralytic* doses. *The pulse*: In the first portion of his investigation the author found that the important and typical effects of strychnine during the *preconvulsant* period are a decrease in the pulse-rate, with higher pulse-curves, and a diminution of arterial pressure; that during the period of convulsions the pulse-rate is usually greatly increased, with lower pulse-curves, but may be diminished while the pressure is decidedly increased; and that, after the period of active convulsions, the pressure sinks to the normal standard, and continues declining, while the pulse returns to the normal, going up or down, as the case may be; finally, they both fail and death occurs, unless artificial respiration is used, under which circumstance both gradually recover. According to the author, there can be no doubt, from such results, that strychnine exerts a number of important independent actions on the circulatory apparatus, and that the effects on pulse and pressure depend upon the drug affecting different parts. The experimenter was not able to find evidence to indicate that any action is exerted on the accelerator apparatus of the heart, or on the heart-muscle itself, unless on the latter after enormous doses. The typical and important effects and actions during the stage of excitement are: a primary decrease in the frequency of the pulse, due to stimulation of the cardio-inhibitory apparatus; then an increase, due to a depression of the same; finally, a decrease, due chiefly to a depression of the excito-motor

ganglion in the heart. *The arterial pressure*: The results obtained from a large number of experiments, employing the various methods of operation ably performed and described, showed that the drug exercises a stimulating influence on the vasomotor system, followed by one of depression; that the increase of the arterial pressure is due to a stimulation of the vasomotor centres in the medulla oblongata; and the fall to their depression, which is preceded and assisted by a depression of the heart. *The respiration*: Reichert has always held, contrary to the opinions of Wood and other distinguished investigators, that strychnine is not a respiratory stimulant in the same sense as cocaine is. The records in his present paper render it apparent that the effects on the respiratory rate are not of a constant character, there sometimes being a decrease, at others an increase, and at others practically no change. It is certainly only in exceptional cases that any decided effect, one way or the other, is noted. Indeed, these records do not, as a whole, differ from a similar set obtained from observations on animals not under the influence of any drug. In none of these experiments were the records made during or immediately after the convulsions. At such times the respirations are almost invariably increased, especially so after the paroxysms. Such an effect, the author believes, cannot be considered in any sense the result of a specific action of the poison on the respiratory centres, but only such as would be expected in all cases of intense muscular and nervous excitement. It cannot, then, be said that this substance, in non-convulsant doses, is a direct respiratory stimulant. Reichert believes that the beneficial influences noted on the respirations by clinicians in adynamic conditions are, doubtless, due to the same actions that give strychnine its value in cases of mental and physical depression,—that is, by increasing the tone of the nerve-centres in general. *The temperature and heat processes*: The author states, from the results of his experiments, that, under strychnine, the increase in heat production is a constant factor, and is favorable for an increase in temperature; but the increase in heat dissipation is not constant, and is antagonistic to a rise of temperature. It would, therefore, seem evident that the primary action was on the process of heat production, and that the effect on heat dissipation was of a sympathetic character, representing an effort of the system to get rid of the surplus caloric.

The actions of *paralytic* doses of strychnine are next discussed. *The pulse*: The author finds that the inhibitory ganglion of the heart is not stimulated by the drug, since a powerful electrical current failed absolutely to cause any inhibition. Thus, it is evident, he argues, that, instead of being excited, the ganglion is depressed or paralyzed. That both the excito-motor and automatic motor ganglia are depressed, chiefly the former, has been sufficiently proven. That the muscle is not appreciably affected is positive from the fact that, after the induction of the stage of complete paralysis, prodigious doses of the poison may be injected without eliciting any signs of its failure; indeed, the heart-muscle is almost the last part of the economy to succumb. In fact, it seems likely that the muscle is, to some extent, stimulated, for it will be remembered that the high pulse-curves, while associated with a slow heart-beat, were not always proportionate to the decrease in the rate, or, in other words, simply due to the greater filling of the viscus with blood. The force of the systole is enormously augmented; and, as far as our knowledge goes, this can only occur from the distension of the heart acting as a direct stimulus, or by direct stimulation of the muscle, or both. It seems that both factors are active in this instance. *The arterial pressure*: In regard to the blood-pressure, the author found that during the stage of excitement the pressure rose rapidly coincidently with the onset of the convulsions, and that the two phenomena were independent. This was followed by a fall as death approached. In studies of the actions during the stage of paralysis, it was found that, after the invariable occurrence of the primary rise, the subsequent changes are of a somewhat uncertain character. The mutations of pressure do not occur after section of the spinal cord, by which the vasomotor centres are destroyed; and, as a consequence, they must be due to actions on those centres. The variable effects must be dependent upon similar vicissitudes of the actions of the poison on these parts, sometimes the stimulant and at others the depressant action being present. The actions on the sensory and motor nerves, on the muscles, the blood, and the temperature and heat processes, were also studied, the results of which will be given presently. An important point referred to by the author is that in regard to the curare-like action of strychnine. He believes that the resemblance, however, does not extend to any important de-

gree beyond the loss of voluntary movement, and then gives a summary of the dissimilarities in the actions of both drugs, as follows: With strychnine, the *arterial pressure exceeds* the normal immediately after the injection, and continues hypernormal if the dose has not been excessive; with curare, the *pressure never, or very rarely, exceeds* the normal, but is almost invariably *depressed*. In strychnine poisoning, *asphyxia* causes a *fall* of pressure; the *opposite* occurs in poisoning by curare. Strychnine causes an *increase* in temperature; curare produces the *opposite*. *Heat dissipation* is *diminished* by strychnine, *increased* by curare. Under the action of strychnine, stimulation of a sensory nerve does *not affect* arterial pressure; the same operation causes a *rise* in curare poisoning. Strychnine is essentially a *motor poison*; curare a *sensory poison*. In strychnine poisoning, the *orbital reflex disappears before* the knee-jerk; under the action of curare, the *opposite* takes place. Finally, under the full influence of strychnine, the *pupil* may be *contracted* to a pin-hole size; in curare poisoning the *pupils* are *dilated*. In concluding his able investigation, Reichert states: 1. The minimum lethal dose for dogs, when intra-venously injected, is about 0.0002 gramme ($\frac{1}{3200}$ grain) to the kilogramme ($2\frac{1}{2}$ pounds) of the body-weight. 2. Doses of from 0.015 to 0.02 gramme ($\frac{1}{4}$ to $\frac{1}{8}$ grain) to the kilogramme ($2\frac{1}{2}$ pounds), intra-venously, cause a condition of absolute muscular quiet, and by means of artificial respiration the animal may be kept alive in excellent general condition. 3. Quantities in excess of 0.094 gramme ($1\frac{1}{2}$ grains) to the kilogramme ($2\frac{1}{2}$ pounds) may be injected intra-venously in divided doses without causing death, provided artificial respiration is practiced. 4. The toxic action of this remarkable substance is so directed to the motor cells in the spinal cord that the minimum poisonous dose is exceedingly small, owing to the production of asphyxia or exhaustion by the violence and persistence of the tetanic seizures. Should artificial respiration be maintained, nearly five hundred times the minimum fatal dose may be injected without causing death. 5. By a proper regulation of the size of the dose and the method of administration, the stage may be prolonged over an almost indefinite period, or may be so brief as to last for but a few seconds. 6. During the stage of excitement the following effects and actions are observed: (a) The motor disturbances and convulsions are of spinal origin. (b) The

sensory nerves and muscles are unaffected. (c) The motor nerves, after the onset and continuance of convulsions, become depressed from overwork. (d) The pulse-rate is first lessened in frequency, then increased, and finally diminished, the first effect being due to stimulation of the cardio-inhibitory apparatus, the second to its depression, and the last to a depression of the excito-motor or automatic motor ganglion in the heart. (e) The arterial pressure is primarily diminished, then greatly increased, and at last diminished, the first effect being due to some obscure action on the vasomotor centres in the medulla oblongata, the rise to stimulation of the vasomotor centres in the same part, and the final fall to a depression of the heart and vasomotor centres. (f) The respiration-rate is not specifically affected unless it be decreased, or during the period of convulsions, when it may be decidedly increased. (g) The bodily temperature is increased, this being due to an increase of heat production, which is to some extent independent of the motor excitement. 7. During the *stage of paralysis*, the following points are noted: (a) The muscles do not seem in the least affected. (b) The sensory nerve-fibres are inexcitable to strong electrical currents. (c) The motor nerves do not respond to strong electrical stimulus, although they may transmit impulses from the nerve-centres. (d) The pulse-rate is reduced, but the height of the curves is increased, the first effect being due to a depression of the motor ganglion of the heart, and the second to the greater filling of the viscus with blood, and, perhaps, to a direct stimulation of the muscular substance; the cardio-inhibitory fibres are paralyzed, but no increase in the frequency of the pulse-rate is observed, owing to the predominance of the depressant action on the heart-ganglia. Stimulation of the vagi causes smaller pulse-curves and a slight increase in the frequency of the beats. (e) The blood-pressure is increased, unless the dose has been greatly in excess, when it is diminished. The increase is due to a stimulation of the vasomotor centres in the medulla, and the decrease to a depression of the heart and to vasomotor palsy; in non-curarized animals the pressure sinks below the normal within a few minutes after the tetanic paroxysm, but in those curarized this depression is less marked, and the stimulant action on the vasomotor centres is stronger; asphyxia or electrical stimulation of a sensory nerve is unable to cause a rise of pressure as in the normal animal, the

former always inducing a fall. (*f*) The hæmoglobin is in some way affected, so that it cannot be oxygenated to the normal degree. The spectroscope reveals nothing but oxyhæmoglobin. (*g*) The sensory and motor nerves seem absolutely inexcitable to strong electrical stimulus, although the latter may be capable of conveying impulses from the nerve-centres to the muscles. (*h*) The temperature is increased, owing chiefly to a decrease of heat dissipation; heat production may be slightly increased or decreased; cocaine is unable to cause a marked increase of heat production and temperature, as in the normal animal; apparently strychnine, in paralytic doses, paralyzes the hypothetical accelerator heat-centres and leaves intact the automatic heat-centres. (*i*) The paralytic condition caused by large doses of strychnine resembles that produced by curare, but is, in many important ways, entirely distinct.

Before the Second International Congress of Physiologists, Wertheimer ³_{Aug. 31} called attention to the energetic vaso-dilator action of strychnine, an action but little known. The author said that, shortly after an intra-venous injection of from 2 to 4 milligrammes ($\frac{1}{32}$ to $\frac{1}{16}$ grain) of the sulphate of strychnine, an excessively intense coloration of the mucous membrane of the lips, gums, and tongue is produced. The circulatory activity is such that often an oozing of blood is noticed on the level of the insertion of the teeth into the alveolæ. The congestion is usually manifest shortly after the arterial pressure has attained its maximum, and disappears, together with the fall of the pressure. This phenomenon, the author contends, is easily understood if it is remembered that strychnine acts at the same time on the vaso-constrictor, as well as on the vaso-dilator, centres. Consequently, in regions where the vaso-dilator actions predominate, there these are manifest and totally mask the antagonistic effects. Such happens in the case of the tongue, and of the labio-gingival mucous membrane, as has been shown by the experiments of Dastre and Morat.

Tannic Acid.—See Gallic Acid.

Tea.—Kraepelin ⁵⁸⁹_{July 11}; ²_{Aug. 27} believes, judging from the results obtained in a special investigation, that tea exercises a stimulating influence upon the sensory processes of the brain, which, after a time, become depressed. The drug, however, has no action, or, at least, a very slight influence, upon the motor processes.

Testicular Fluid.—In a recent communication to the Académie

mie des Sciences, Brown-Séguar^d_{June 24; Sept. 80} gives the results of three years' use of the subcutaneous injections of testicular fluid, especially in old men. The author believes that the sexual glands have at least three distinct uses, consisting, *first*, in their rôle in procreation; *second*, in the influence that certain principles that are absorbed from them have on the nerve-centres, giving the physical, moral, and intellectual characters proper to the sex; *third*, in a special tonic action, which increases certain active powers of the brain and cord. It is this last that is the special subject of Brown-Séguar^d's study. He insists that the fluid does not act as a stimulant which calls into action pre-existing forces, to be followed by depression, but that it increases the transformation of energy to which are due the various powers of the spinal cord and brain.

Urechites Suberecta.—A preliminary study of the physiological action of this plant has been published by Ralph Stockman.²_{June 18} He finds that the active principle, urechitin, is a poison of a very active kind, which may be included under the digitalis group. Its action on the frog and frog's heart, the effects on dogs, the comparatively large doses required to affect rabbits, and its action on the circulation, point to a similarity between it and all other substances which have been recognized as essentially resembling digitalis in their physiological actions. Urechitoxin may also, for the present, be included in the same group, which is, as now understood by pharmacologists, a pretty wide one, and embraces substances which are certainly not quite identical in action. The differences, however, have not been satisfactorily worked out. Urechitoxin, although essentially a muscle and heart poison, shows certain well-marked peculiarities in its action; these, and the final details of the actions of both substances, Stockman has made no attempt to work out for the present.

Urechitin.—See *Urechites Suberecta*.

Urechitoxin.—See *Urechites Suberecta*.

Vicia Sativa.—From this plant E. Schulze⁸³_{Sept. 27} has obtained the following nitrogenous compounds: Asparagin, glutanin, leucin, amido-valerianic acid, phenylalantin, traces of tyrosin, besides guanadin, cholin, and betain.

ELECTRO-THERAPEUTICS.

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GENERAL CONSIDERATIONS.

IN the domain of electro-therapeutics, great interest has been excited by the thesis of Moebius.⁸⁶⁶ in which he denies, very broadly, that electricity has any curative qualities *per se*. He claims that, in 80 per cent. of all cases in which its action seems beneficial, this is due to its psychical, not its physical, influence. Moebius's views are: (1) that it has not been proven that electricity has a curative action on organic paralysis, and that paralyzes which improve under electricity would do so without it; (2) that many functional troubles are relieved by electricity, and also by suggestion; (3) that electricity acts by influencing the mind only; (4 and 5) that the extreme variation in the action of electricity, both galvanic and faradic, can only be explained by assuming that it acts by influencing the mind of the patient. Eulenberg⁴ undertakes to answer Moebius. He asks, in regard to the first point, whether the recovery is not more rapid with electricity, and whether the results obtained in paralyzed animals are due to suggestion. In answer to No. 2, he points out that these troubles are also relieved by morphine, atropine, bromides, and arsenic, and asks whether these, too, as well as massage and hydrotherapy, act psychically. Eulenberg also points out that we are dealing with vital processes and not with dead material, and that we cannot predict the action of even such well-known drugs in all cases. Weiss also combats Moebius,² saying that stimulation promotes nutrition and prevents atrophy. Cerebral and spinal hyperæmia are lessened. He indicates some of the uses of the different currents,—as general faradism for debility and malnutrition, galvanism for neuralgia and commencing degenerations, faradic

baths in lessened motor activity, functional spinal affections, intestinal atony, and neurasthenia; and, in greater strength, in neuroses accompanied by spasmodic convulsions or tremor; also, galvanic baths in exophthalmic goitre.

In support of Moebius, Schultze⁸⁴⁴_{Apr.9} claims that there is no actual change in the time required for a cure. There is a beneficial action on the muscles. In spinal diseases there is only small benefit, on account of defective nerve reaction. In poliomyelitis the therapeutic value is small, and due to suggestion. Electricity is valuable only symptomatically. Moll, of Berlin, is also on the same side. He disbelieves in electricity, and ascribes⁴⁷⁵_{Hefl 41, Nov., '91} its apparent effects to delusion from a concurrent spontaneous cure and to psychical effects.

Possible Electric Polarity of Metabolism.—W. J. Morton, New York, has written an interesting paper⁵⁹_{Sept.3} in which he offers these conclusions, subject to modifications from experience: 1. Disease exhibits polarity. 2. This polarity may be augmented or counteracted by an applied current, and thus the disease be augmented or counteracted; and one result may be that the future electro-therapeutist will, by delicate tests, ascertain the polarity of the part to be treated by electricity, just as the chemist ascertains by litmus-paper whether his solution is acid or alkaline. 3. That should this polarity be thought to be due to other causes (circulation of fluids, osmosis, etc.), it may still afford a guide to electric treatment, by means of which counter or similarly applied polarities may counteract or aid the causes, and thus counteract or aid morbid processes. Witness the antagonistic relations of Porret's and Quincke's phenomena. 4. That this index of polarity may provide an invariable guide to treatment, and that thus electro-therapeutics may be reduced to an exact science.

Influence of Electricity on Organic Life.—Larat, Paris, in an instructive address on this subject,⁸⁷⁹_{Mar.} has gathered many scattered facts and observations bearing on it, and has attempted to make some deductions. He speaks only of general manifestations. In the normal state the living being is subject to both external and internal electrical influences. Static tension and terrestrial magnetism are the external; chemical action is the chief source of the internal. The static potential varies in individuals according, sometimes, to the state of the skin; a dry skin in cases producing

a high potential with augmentation of nervous and nutritive phenomena, as seen by increased urinary excretion. All these phenomena are lessened in low barometrical pressure with humidity. Hence, differences in atmospheric conditions entail changes in the amount of static body potential. As applied to micro-organisms, he asks why they should not be similarly affected, and propounds the theory that the turning of milk in thunder-storms is due to the sudden hyper-development of numerous colonies of microbes forced by the high static tension, and, perhaps, by the production of excessive ozone. In regard to faradism, he finds that tissues suspended between the poles of a faradic battery are *paramagnetic* if they take an axial direction, and *diamagnetic* if they take an equatorial direction. The living body, as a whole, is *diamagnetic*, as proved by the experiments of Rabuteau. The current may have a decided effect on the development of the foetus, as experiments on its analogue—the egg—show. The current also modifies the molecular equilibrium of the body. At any rate, it is certain that local currents of feeble intensity make a local impression on the nervous system. More powerful and general currents ought, therefore, to modify the functions of the system in general, and hence modify nutrition.

Effects of Galvanism on Protoplasm.—Following up this line of thought are the experiments of Verworn, Jena. ³_{Sept. 7} These were carried on on infusoria to determine the polarity of the protoplasm. Generally, after the closure of the current, the irritation is localized at the anode; that is, a negative galvano-tropism is developed. A few present the reverse condition, and a few are bipolar, turning their axes parallel to the axis of the current.

Influence of the Constant Current on Microbes.—In a long series of experiments, Apostoli and Laguerrière, Paris, ⁷²⁰_{Aug., '91} made use of cultures, both of pathogenic and non-pathogenic microbes, followed by control experiments with inoculations. In the first series the poles were placed at a distance from each other, in a homogeneous medium in the same tube. Their conclusions were: 1. That the action of the current is in direct relation to its intensity measured in milliamperes. 2. For the same intensity, other things being equal, little account should be taken of the duration of the application, the intensity being the principal factor, and not the duration; providing, always, that the latter should have a mini-

mum of five minutes. 3. A current of 300 milliampères and over, applied during five minutes constantly, kills the bacteria of carbuncle. Cultures made from those thus treated remain sterile and inoculations are ineffectual. 4. A current of 200 to 250 milliampères for five minutes does not surely destroy their activity, but retards it. 5. A current of 100 milliampères or less, even applied for thirty minutes, does not destroy their activity. It does produce an attenuation, which modifies it.

In the second series the study was of bipolar and interpolar action: (1) in a homogeneous medium a constant current is without effect, *sui generis*, on microbe cultures; (2) the only action noticed was at the positive pole; (3) there was no sensible action at the negative pole or in the interpolar current; (4) this action is purely chemical or electrolytic, and due to the nascent oxygen disengaged and accumulated at the positive pole; (5) the attenuation of the microbes follows the laws of electrolysis, and is proportional to the intensity of the current and the duration of the application; (6) the microbicidal action of the positive pole is less energetic than when the poles are contiguous; (7) a feeble current, below 50 milliampères, can bring back the activity of a culture previously attenuated and revivify the microbes by the presence of oxygen in feeble quantity.

Therapeutic Effects of the Electric Light.—Gatschowski,²¹_{May 23} has made some novel and interesting experiments designed to elucidate this question. He has used a modification of Stein's apparatus, the light being reflected, by means of a laryngeal mirror, to the seat of pain. In this way he has obtained excellent results in the treatment of muscular rheumatism, joint rheumatism, neuralgia, migraine, toothache, etc. Whether the light or the heat is the true therapeutic agent the author has not been able to determine, but he has now in progress a series of control experiments for that purpose.

The Physical and Therapeutic Effects of the Alternating Current.—Larat and d'Arsonval, of Paris,³_{Apr. 30} show that the alternating current increases the respiratory capacity of the blood from 40 to 50 per cent., and the quantity of urea eliminated by one-third. The sinusoidal method was of especial use in diseases of sluggish nutrition,—as obesity, gout, rheumatism, eczema,—applied by means of a bath. In some cases the quantity of urea excreted

after several baths has changed from 14 to 24 grammes per twenty-four hours to a normal quantity, and the general condition has been much ameliorated.

Another able paper on the same subject by Gautier and Larat, of Paris, was read at the meeting of the Association Française pour L'Avancement des Sciences, Section des Sciences Med., held at Pau, September 17, 1892.³_{Sept. 21} Their conclusions were: (1) that the alternating current increases the elimination of urea, the chlorides, and the phosphoric acid; (2) it stops the excess of uric acid; (3) it diminishes, sensibly, the sugar in diabetics. Contrary to the generally received opinion of the danger of strong alternating currents, Dawson Turner, of London, has shown, by a series of experiments,¹⁵_{July} that a current of high potential and great frequency of alternation is safe. He used Tesla's current, alternating from 500,000 to 10,000,000 times a second, with a voltage of from 100,000 to 1,000,000. This can be safely passed through the body where a current of 100,000 times less would be serious or fatal in its results. The great frequency of the alternations is obtained from the oscillating disruptive discharge of the Leyden jar, mechanical means being useless. The immunity of the body is explained by Thomson, of Edinburgh, by the theory that such currents are carried along the surface merely, and by others on the supposition that the tissues cannot respond to such rapid alternations. As to the physiological effects, none have as yet been observed, beyond a slight stimulation of the vasomotor nerves. The experiments seem to open up a new field for research.

The Physiological Effects of the Franklinic Current.—Damian, of Paris, demonstrates that, under the positive electricity, the heart's action is stimulated, the circulation improved, the temperature raised, and the urea increased. Under the negative electricity, the amount of urine was increased, and the urea, phosphoric acid, and phosphates diminished. Psychic effects were also demonstrated.

Electrical Appearances of the Brain.—Cybulski, of Cracow, states⁸⁴⁴_{Mar. 12} that the anterior portions of the brain appeared to be electro-negative. Changes of localization were shown at the point of irritation. At the beginning of the experiments the electrical appearances were obscured by the circumstances of the operation. Injury to the brain itself led to a negative tension at the point of

injury similar to an irritation at the cortex. After the consequent convulsions, other changes were shown by the galvanometer.

ELECTRO-THERAPEUTICS.

Insanity.—Lomas, Portugal, has reported two cases of insanity treated by faradism.⁸⁶¹ One was of melancholia and one of mania, both resulting in dementia with profound physical depression, anorexia, involuntary discharges, etc. There had been no improvement under medication. Faradism was resorted to, daily sittings of ten minutes being held. The negative pole was placed at the neck, the operator holding the positive pole with one hand, while with the other the current was completed,—sometimes cephalic and sometimes general, the current feeble. After twelve days the first case was ameliorated, and, in a month, was cured. The second case had a similar result. A case of mania of epilepsy was under treatment, but no results reported.

Morel, of Ghent, confirms Lomas's observations. According to him, it is in the melancholias, and especially those associated with stupor, that electrotherapy seems to be of the most efficacy. In partial delirium it acts well on certain symptomatic elements, such as hallucinations of hearing. At present an empirical plan of treatment is necessary, the morbid indications not being well established.

Sciatica and Neuralgia.—Rouveix, of Saint-Germain-Lembron,³ has used constant currents with success. All sciaticas ought not to be treated alike, and a distinction must be made between acute cases characterized by pain and old cases characterized by difficulty and stiffness of motion. In the former, diminishing currents, which will ease the pain, followed later by increasing currents, should be employed; for the latter, increasing currents are to be used from the start. But if the acuteness of the attack has not passed there will likely be a return of the pain. It is important to be well assured that the neuralgia is essential and not symptomatic, for in the case of a symptomatic sciatic neuralgia from an osseous lesion the intemperate employment of constant currents would present serious drawbacks.

Articular Inflammatory Exudations.—Galvanism has been used by Cleaves, of New York,⁶¹ with much success. The treatment was based on the hypothesis of Morton, of New York, that

“living means nutrition, nutrition means chemical action; chemical action, under proper conditions, means electric current. These conditions are: (a) a closed circuit, combined with (b) any two different tissues,—(c) one acted on, the other not.” Proliferation is excessive chemical nutrition, which the positive pole makes more excessive and the negative pole diminishes. The anode is placed over the spinal region or a distant part; the cathode, carefully guarded, over the seat of exudation. Frequent sittings, with moderate current. Von Raitz⁶¹_{Feb.13} also reports a series of cases of ankylosis cured by same method.

Epithelioma.—A case of recurrent epithelioma of the perineum, previously operated on by the knife and successfully treated by electricity, is given by Parsons.²_{Nov.7,91} The alternating current, of intensity from 400 to 600 milliampères, was applied, followed by separation of the growth and healthy granulations. No recurrence at time of report,—seven months. The diagnosis was confirmed microscopically.

Aortic Aneurism.—Gilles, of Paris,⁴⁶_{Mar.1} reported two cases in which the anterior arterial wall had disappeared and the aneurism had become “diffuse consecutive.” The heart was small, the second beat very clear, in spite of an aortic insufficiency. In analyzing the cases, from a galvano-therapeutic point of view, he finds in one an undoubted arrest of the disease, the restoration of the vitality of the sac, and a survival for six months at least. Had not a second operation been refused on account of the pain, cure would have been effected. In the second case three months’ amelioration of symptoms took place, and the treatment was resumed *in extremis* without result. Both died, finally, of pulmonary tuberculosis. His conclusion is, that we have a right to resort to the operation when all other means have failed to be of value. No details of technique are given.

Intestinal Occlusion.—The uses of the constant current have been made the subject of several communications. Semmola, of Naples, reports a unique case,²_{Feb.20} in which he shows (1) that there may be an intestinal occlusion due to transient intestinal paralysis, through defective innervation and (2) the rapid effect of the constant current in such cases. The diagnosis was based on the sudden onset of pain, its paroxysmal character and freedom in the intervals, the visibility of the intestinal coils, the ster-

coraceous vomiting and constipation following repeated purgings, paralysis of the bladder, and neurotic temper of the patient. Laparotomy had been advised, but Semmola insisted on trying the constant current. This was supplied by a Daniell battery with Onimus's piles, of an intensity of 10 milliamperes at each application. The positive pole was by means of a rectal catheter, carried twenty to twenty-five centimetres up the bowel, and the negative pole, which was olivary in form and covered with a cloth steeped in a saturated solution of sodium chloride, was rubbed transversely over the surface of the abdomen, especially over the colon. There were three sittings daily, of eight to ten minutes each. By the end of the first day the retention ceased; the patient was able to pass water freely; his general condition improved, especially subjectively; and the attacks of pain were less violent. After the ninth sitting the patient had spontaneous motions of the bowels and by degrees completely recovered.

Soutakis, of Constantinople,²⁹²_{Mar.15} also reports, among others, a similarly interesting case. The symptoms were almost identical with the previous case. Complete recovery followed. The current used was of greater intensity than in Semmola's case, reaching 45 milliamperes for twenty minutes. Faradization is useless, because it causes contraction of striated muscles only by reflex action; but these muscles are paralyzed, and hence fail to respond. The value of the treatment is proved by a percentage of 70 per cent. in over two hundred recorded cases; hence it should always be tried before resorting to laparotomy.

Diminished Peristalsis.—Stockton, of Buffalo,⁶¹_{Feb.15} has studied the effect of a gastric electrode in this disorder, and reports forty cases covering (1) those where motility of the stomach is simply weakened, (2) where there is dilatation, and (3) where there are gastric catarrh and atrophy of the gastric mucous membrane. The electrode consists of an ordinary stomach-tube, twenty-eight inches long, with two openings near the distal extremity. At the proximal end it is fitted with a hollow steel coupling, which, attached to three feet of rubber tubing, makes a continuous siphon of about five feet. With this the stomach is emptied, and, without removing the instrument from the stomach, the tube is disconnected at the coupling, and a spiral wire, also twenty-eight inches long, is introduced into the tube and the coupling closed by a polished

steel plug at the proximal extremity. In this way the current is conveyed and the gastric membrane protected from contact with the electrode. After the application, the electrode is removed, the tube coupled on, and the contents of the stomach withdrawn.

In the first class of cases the faradic current is most satisfactory with a strength sufficient to produce contraction of the abdominal muscles and movements of the stomach, and continued from five to eight minutes, increasing until the limit of endurance is reached, as shown by an excessive secretion of mucus, a disturbance of digestion, or a feeling of lassitude or pain. Treatment should be kept up for a long time; in some cases, however, only at intervals.

In the second class of cases the faradic current is also most satisfactory. In the third class, where there is gastric catarrh, the continuous current does best, with the anode within and a large sponge-cathode externally over the back, with a dosage of 8 to 15 milliampères. As a rule, treatment is best given at bed-time, and the stomach left empty and at rest during the night.

Wolff, of Philadelphia, confirms these statements⁶¹ in a paper of value.

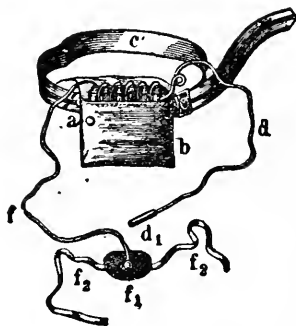
Opacity of the Cornea.—Alleman, of New York,²⁴⁴_{Sept., '91} has obtained favorable results by means of galvanism. He believes that, under the catalytic action of the current, nutrition is increased, and this gives rise to an absorption of the cicatricial tissues. Vascularization is intense, and, in those cases in which the vessels push into the cornea, the prognosis is favorable. The age of the opacity does not seem to have any influence on the result, but the general condition of the patient does. Tubercular subjects are unfavorable.

Bloebaum, of Coblenz, in an article on "The Galvano-Cautery and Electrolysis with the After-Treatment by Means of Some New Remedies,"⁴¹_{June} reviews the uses of electricity in diseases of the eye, ear, nose, and throat. In ulcerations of the cornea he has had excellent results. He distinguishes the diseased area from the healthy tissue by instilling a 2-per-cent. solution of fluorescent potash, which colors the ulcer green. The line of demarkation can then be easily seen. The after-treatment was atropia and boric acid. Healing in eight days. Latterly he has used a drop

of methylene blue over the burned surface at the time of operation. The healing process was hastened.

In hypertrophic rhinitis he believes in linear cauterizations from behind forward. The after-treatment is essential, and consists in the application of methylene blue daily for five days, and, after that, the insufflation of dermatol. In diphtheria he has employed the galvano-cautery with surprising results, claiming a cure of thirty-nine cases out of forty. Methylene blue was here, also, the after-treatment. This is, indeed, extraordinary, and one questions the correctness of the diagnosis and observations. The whole article is rather a plea for methylene blue.

Incontinence of Urine.—Danion, of Paris, has made a report on the utility of electrotherapy in diverse forms of incontinence of urine to the Sixth French Congress of Surgery. ³ Apr. 30 His



GRIMM'S BATTERY.
(*Internationale klinische Rundschau.*)

observations were nine in number, leaving out those on nocturnal incontinence in children. The treatment consisted in the application of the faradic current by shock and tetanization to the neck and the membranous portion of the urethra. The effects were proved by Guyon, of Paris, and himself to be not only favorable and rapid, but sometimes really remarkable.

Grimm, of Vienna, has brought forward a new instrument designed for applying the constant current in cases of enuresis. ⁵⁷ Feb. 29 This consists of a chloride-of-silver dry-cell battery (a), incased in a leather pouch (b) and attached to a belt (c) which is fastened around the waist of the patient. One electrode ends in an olive-pointed zinc bulb (d₁), which is attached to the rheophore (d), and which, well oiled, is placed in the rectum. The other electrode

(f_1) is a flat sponge, connecting with the battery by f , and attached to the thigh by the straps ($f_2 f_2$). This sponge is moistened with salt solution. The battery gives a current of from 2 to 5 milliampères, and should be employed each night, before retiring, for five to ten minutes. The great advantages of the method are its success and the ease of handling by the laity without medical assistance. For girls it is especially useful, and should be limited to enuresis from faulty innervation and not due to urethral or bladder disease.

Strangury.—In regard to the electrostatic treatment of this disorder, Benedikt, of Vienna, gives ¹¹³_{No. 27, '91} notes of two cases that were quickly relieved by applying the electrostatic douche and sparks to the spine and hypogastrium. Previous treatment had failed to ameliorate. Case I was tabes of long duration, strangury being the most distressing symptom. Relief was increased by each application. In Case II the affection followed an operation for hæmorrhoids many years before. Immediately after the first sitting the number of nocturnal micturitions sank from twenty-five to nine. A fortnight's treatment reduced the abnormal state to a minimum. More recent successful cases led him to regard this therapeutical means as a specific.

Gastric Disorders.—M. Einhorn ⁵⁹_{Feb. 6} reported several cases treated by means of the stomach electrode. In one case cited by him, of nervous vomiting, a remarkable amelioration ensued after several weeks of galvanization. Pains almost unchanged. In three cases of dilatation the constant current was applied, with frequent interruptions. In all these cases there was improvement in stomach digestion, notwithstanding that the size of the stomach did not noticeably decrease. In five cases of severe gastralgia galvanization alone brought benefit. Other therapeutic measures proved of no value. Einhorn's reason for selecting the negative pole for introduction into the stomach is, that the cathode is understood to produce stimulating action. He presupposes a diminished function, either of the secretory nerve or the nerves which control the carrying along of the contents. The positive pole relieves pain, and so this was placed on the part of the skin where the pains were most severe. Cases of relaxation were also favorably influenced by faradization.

Dental Disorders.—As a means of diagnosis in obscure cases

of the vitality or non-vitality of the dental pulp, J. S. Marshall, of Chicago, ⁶¹_{Jan.2} knows of nothing so sure to demonstrate to a positive certainty these conditions as the electrical currents, both the galvanic and the faradic.

In the more obscure cases, however, the faradic is superior to the galvanic, for if there is the slightest vitality remaining in the pulp it will demonstrate it instantly by causing a response in the tooth. It is superior in this respect to the transmission of light by the electric mouth-lamp, for, many times when the condition is upon the border-line between the life and death of the pulp, the electric light fails to satisfactorily demonstrate the condition.

He also believes that the electric currents will serve to demonstrate the presence of low grades of inflammation of the tooth-pulp so often the cause of various forms of neuralgic conditions of the face and head. The faradic current especially, if applied in such cases, will demonstrate a hyper-sensitive condition of the tooth-pulp. In order to locate the tooth causing the neuralgia, it will be necessary to apply the current to each individual tooth; the diseased one will give more active response to the current than will the healthy teeth; in other words, the diseased tooth will not bear so strong a current as will the healthy ones.

ELECTROLYSIS.

Cancer.—This subject received considerable attention during the year. Delineau, of Paris, ⁷²⁰_{Feb.} has used it interstitially in cancer with gratifying results. He, indeed, reports a case of supra-clavicular carcinoma cured by it. The needles were plunged into the substance of the tumor, the negative pole being placed behind the shoulder. Several sittings were had with a current of 25 milliampères. Instead of the usual platinum needles copper ones were used, and more satisfactorily. With the latter there was no trace of burning at the perforation, while with the former the tissue at the point of perforation became black, an inflammatory areola was formed, and the perforation was permanent. The beneficial results he ascribes to the needle becoming soluble and forming an oxychloride of copper, which acts on the tissues. Gautier, of Paris, ³_{Sept.21} has also used this method for two years with great satisfaction. The copper needle is always the positive pole.

Angiomata.—At the session of the Assoc. Franc. pour l'Avancement des Sciences, held at Pau, Bergonié, of Bordeaux, ³_{Sept. 21} read a paper on the bipolar method in the electrolysis of these growths, in which he sums up the following advantages: (1) exact limitation of the electrolytic action to the interpolar space by reason of the concentration in that space of the lines of flow of the current; (2) cessation of accidents and painful phenomena caused by derived currents touching a nerve-trunk or nerve-centre by rendering it indifferent to the electrode; (3) employment of very high intensities, permitting a rapid destruction of tissues with few and short sittings.

VOLTAIC ELECTRO-PUNCTURE.

Cancer.—At the Surgical Congress held in Paris, Danion, of Paris, ⁹¹_{May 10} reported three "proved" cases of cancer in which he had an opportunity of trying voltaic electro-puncture. In one of these (cancer of the breast) the evolution of the disease was checked, and an enlarged gland in the axilla disappeared under the treatment. The origin of the disease dated five years back. In a second case of mammary cancer the development of the disease was also arrested and the pain had ceased, but the case had been only five months under observation. In the third case the result was "nil."

Upper Air-Passages.—In special surgery, Grünwald, of Munich, has made some new applications. ⁶⁹_{May 5} In chronic catarrhal pharyngitis he plunged an insulated copper point on a platinum needle into the swollen tissues with a current of 15 milliampères for ten seconds. Cocaine was not used. This operation was repeated several times at short intervals, changing the point of application. Strong currents were used for a short time. The pain was very slight. The reflex symptoms were quickly and markedly relieved. These were cases in which the galvano-cautery and chromic acid had been used without success. He thinks the hypertrophies had been caused by irritation from the passage of food. The indication for treatment was not the amount of hypertrophy, but the severity of the reflex symptoms. At the negative pole there was a white frothing and slight swelling, but this soon subsided and there was no cicatrix left. In this respect he considers the method as superior to the galvano-cautery. Twenty cases were recorded.

Chronic Obstructive Rhinitis.—In thirty-three cases he had marked success, twenty-two cases being cured. The obstruction was due to hypertrophy of the turbinated bodies. He is an absolute disbeliever in the total destruction or ablation of the turbinated bodies, owing to the tendency to chronic atrophic rhinitis. The treatment by linear cauterizations is very delusive, recurrence of the hypertrophy after a time being the rule. The currents should be varied, according to the sensitiveness of the patient, from 5 to 15 milliamperes for a period of five minutes. Cocaine is not necessary, as the pain is slight. In the cured cases there was no recurrence. In all the others there was great improvement. Grünwald believes the efficacy of the method is due to the narrow limitation of the chemical action.

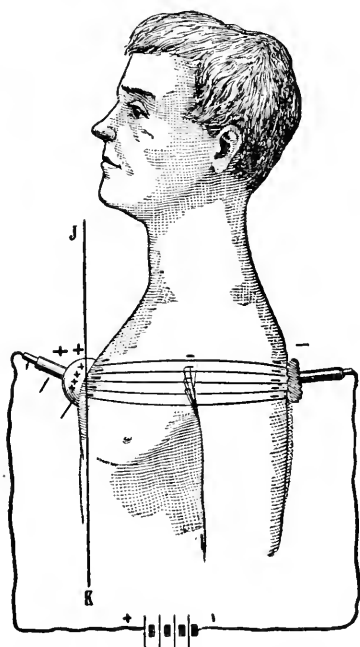
Tubercular Laryngitis.—He used the same method in nine cases of tubercular laryngitis, of which five were markedly improved, though not cured. In all, the improvement was favorable. Gilles, of Paris, has also discussed this subject.⁴⁶ Mar. 15 He prefers the method to that of interstitial injections, because the latter form a sclerosed surface, while the former does not. He attributes the efficacy (1) to localized heat and (2) to localized chemical action from the solution of the electrode, and predicts a vast and useful field for the method.

Affections of the Male Urethra.—At the meeting of the Ireland Academy of Medicine, in May, 1892,² July 2 the general opinion was that in gleet, in patches of granular urethritis, and in ulcerations the method by electrolysis was a success, but that no permanent result could be looked for in stricture. Swan, Thomson, McArdle, Tobin, and Sir W. Stokes, all reported unsatisfactory experiences. Pearson upheld the method.

NEW ELECTRICAL INSTRUMENTS.

A. D. Rockwell, of New York,⁵⁰ May 14 describes a new depolarizing electrode, which combines special electro-therapeutic properties with an adjustable artificial resistance, the idea being to bring that portion of the body between the two electrodes under the influence exclusively of either the positive or negative pole of a voltaic battery. This new electrode is represented in the diagram as being connected with the positive pole of the battery, while an ordinary electrode is connected with the negative pole. The neutral

point, J K, is represented as having shifted from a central point in the body to the porous diaphragm of the electrode, and the whole of the body intervening is represented as being under the influence of the negative pole. In the use of this electrode it will be observed that the point of electrolytic action is supposed to be displaced outward, from the part of the body immediately underneath the electrode, to the metal conductor in the electrode. The explanation of this is that, by using an electrolytic fluid not altogether dissimilar to that of the fluids of the body, and introducing into



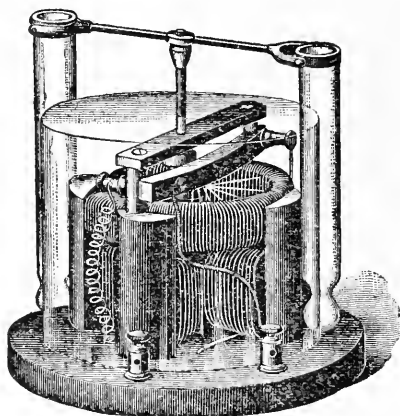
THE DEPOLARIZING ELECTRODE.
(*Medical Record.*)

the circuit, by means of said electrode, an artificial resistance equal to or greater than that of the body, the polar influence of the voltaic current on the portion of the body adjacent is wholly eliminated, the neutral point is displaced outward, and the body may be said to be under the influence of the opposite pole of the battery.

Experimental observations proved interesting and suggestive. The following is one of several: The hind legs of a decapitated frog were subjected to the influence of a weak galvanic current passed from the toes to the lumbar region of the spine. With the

new electrode in use, connected with the negative pole, the muscles of the thigh exhibited diminished irritability, and failed to respond to any ordinary strength of current. On the contrary, when the connection was made with the positive pole, the leg exhibited the so-called phenomenon of catelectrotonos,—readily responded to a comparatively weak current.

Rockwell claims to have observed very positive and valuable therapeutic results in the use of this electrode, the indications for which are self-evident. In one case of palsy agitans, which had resisted all the usual electrical methods, rapid improvement followed the use of this electrode connected with the negative pole, thus completely eliminating its influence and subjecting the diseased member and central nervous system to the action of the positive pole alone.

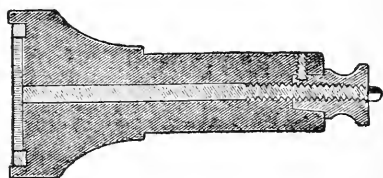
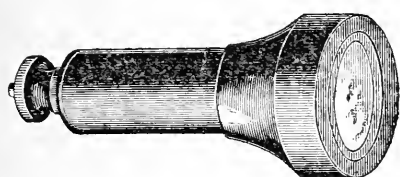


STENBECK'S CENTRIFUGAL MACHINE.
(*Internationale klinische Rundschau.*)

Stenbeck's Centrifugal Machine is described by L. Kawen, of Czernowitz.⁵⁷ This has for its object the quicker and more perfect separation by means of centrifugal action, especially from their fluids, of the solid portions, cells, inorganic matters, bacteria, crystals, and amorphous matters, of which an examination is desired. The ordinary method by sedimentation takes hours, and sometimes even days. By this method urine is sedimented in from two to three minutes, also serous exudates, fluid from hydatid cysts and hydronephrotic kidneys, without further preparation. Very purulent and slimy tenacious fluids must be thinned. It is adapted for the examination of tubercular sputum. This is first thinned

by a weak solution of sodium chloride, then allowed to stand for forty-eight hours, and then put into the machine. The method is also serviceable in detecting bacilli in urine, in differentiating hæmaturia and hæmoglobinuria. In the former case the urine remains colored red; in the latter, not. The machine, which is illustrated on page 16, consists of a vertical axle attached to an electro-magnet. At the top of the axle are two projecting arms, and at the end of each is attached a glass tube by a swivel top. The machine is put in motion, and the tubes rise to the horizontal, when the solid matters are deposited in the end of the tube. A most excellent addition to the armamentarium of hospitals and laboratories.

A *Cataphoric Electrode* is presented by McBride, of Springfield, Mo., ⁴⁰Aug. which obviates some of the difficulties arising from the escape of the fluid medicine. One difficulty has been the immovable character of the cup, so that when close contact is desired,



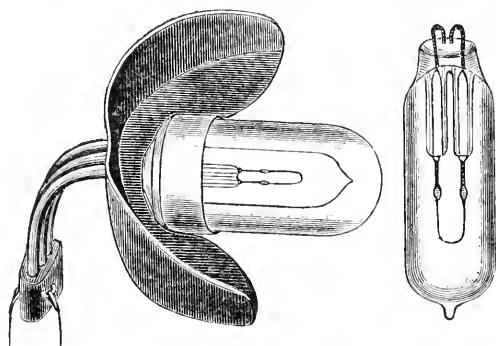
CATAPHORIC ELECTRODE.
(Gaillard's Medical Journal.)

or uneven surfaces to be covered, either the fluid or the resistance is too great. In this instrument such is not the case.

Phonograph and Micro-graphone.—J. Mount-Bleyer, of New York, ¹¹²Aug. describes how these can be used in recording observations of normal and abnormal conditions in diseases of the nose, larynx, chest, etc.; also in singing, speaking, etc. The difference shown in the methods of various singers is marked, and disease affecting the singing voice shows itself in alterations varying according to the method. These cylinders are of value in general medicine. Certain coughs have been reproduced, and are useful in teaching and in diagnosis. Among these are the whoop of pertussis, asthmatic breathing, tracheal stenosis, cries of children at various ages, etc. This application opens a new and wide field for investigation and usefulness.

A new lamp for transillumination of the face is shown on page 18. ⁶May 28 The lamp is of five-candle power. The glass covering

protects the mouth from heat, and the lamp from breakage. The vulcanite flange has free communication with the external air by



LAMP FOR TRANSILLUMINATION.

(*The Lancet.*)

tubes, which carry the wires and allow cooling. The wide flange prevents undue diffusion of light through the teeth and lips.

GYNÆCOLOGICAL ELECTRO-THERAPEUTICS.

By G. APOSTOLI, M.D.,

AND

JULES GRAND, M.D.,

PARIS.

DYSMENORRHŒA.

Lapthorn Smith, of Montreal, ²⁸²_{June} reports nine cases of severe dysmenorrhœa cured by the intra-uterine application of the negative pole. He passes in review the causes and symptoms of the disorder, which may be classed under two heads, according as the disorder proceeds from functional or organic disease of the uterus. In the first group he places ovarian congestion, varicocele of the pampiniform plexus, always accompanied by chronic ovaritis, and followed by atrophy of the ovaries; inflammation of the tubes and peritoneum covering the appendages, with more or less exudation, which fixes the tubes and ovaries in abnormal positions, thus causing interference with their normal functions. Dysmenorrhœa of uterine origin comprises all causes which offer an obstacle to the issue of menstrual blood, whether organic or functional,—deviations, polypi, fibromata, or simply a thickening of the mucous membrane of the uterus (endometritis). This latter affection is almost invariably accompanied by dysmenorrhœa. The most efficacious treatment is that which is successful in curing the endometritis: cure of habitual constipation; removal of obstacles to the pelvic circulation by hot injections, and tampons of glycerin and boric acid; rapid dilatation; curettage; application of the galvanic current, either internally, by the abdomen, or by the sacro-vaginal method, to tone up the vascular system of the pelvis; and, most important of all, intra-uterine application of a mild galvanic current with the negative pole.

After a complete trial of all methods, some of which gave him successes and others failures, Smith declares that the negative pole cured endometritis and dysmenorrhœa when all the rational means enumerated above had failed.

Treatment with Opiates must be Proscribed.—It has led too often to morphinomania. Smith quotes Winckel as follows: “I have tried all measures,—dilatation of the uterine cavity; discission of the cervical canal; cauterization with nitrate of silver, tannin, tincture of iodine, phenic acid; curettage, scarification, leeches to the vaginal cervix. I have also had charge of patients for whom my colleagues employed all these measures, but without better results. I have never cured a single case by these means.”

In reality, in view of the inefficacy of all these treatments, many patients having endometritis considered their cases incurable. Their suffering was sometimes so great that many gynæcologists, when the least touched by the “prurit secandi,” thought themselves justified in attempting operations which not only mutilated the patients, but often endangered their lives. When the operation had ameliorated or cured the periodical pain, the endometritis, upon which the dysmenorrhœa depended, was not permanently cured, and the patient was not relieved of the pain in the kidneys, the head, and other reflex nervous troubles of which she had before complained.

The treatment praised by Smith does not mutilate the patient, is absolutely without danger, does not require anæsthesia, being entirely painless and easy of execution, and, finally, it not only cures the periodical pain, but, at the same time, ameliorates the general condition, and produces a general sense of well-being which is manifested in the first or second *séance*. It is incomparably superior to all other treatments. The only one which may, perhaps, be compared to it is rapid dilatation, followed by slight cauterization of the cavity of the uterus, and drainage with iodoform gauze; but even this is inferior to electricity, for it sometimes fails and has to be again performed.

Among nine patients whose history is given by Smith, several had been previously treated by dilatation and curettage; castration had been proposed to and refused by another. It is to be observed that the good results obtained by him with electricity date back four years, and are still maintained in several cases. His conclusions are that galvanization with the negative pole and currents of weak intensity, between 20 and 50 milliampères, should be tried before all other measures. Sprague⁴⁸_{Apr.} has obtained the best results from a strong faradic current in the pains of the men-

strual period. He employs weak currents, not exceeding 25 millampères, with reversal in menorrhagia.

MENORRHAGIA.

A. W. Terry, of Denison, Texas, ⁷²⁰_{June 4}, relates the case of a woman of 35 years, with two children, who, following abortion, suffered from subinvolution and a profuse hæmorrhage which confined her to bed for six months after. During this time five or six of the best physicians of the town had tried all treatments, internal and local, including curettage. She had not ceased to lose blood for a single day, and every two or three weeks it came in torrents, until syncope supervened. The uterine sound revealed a depth of eleven and one-half centimetres. On the 5th of January intra-uterine faradization for five minutes arrested the hæmorrhage, which did not return. Four intra-uterine positive galvanizations of from 30 to 60 millampères, of three minutes' duration, made from the 7th to the 20th of January, completed the cure, without any other medication. At this date the uterus had resumed its normal dimensions, and menstruation has since been normal and regular.

AMENORRHŒA.

Nitot, of Paris, ²⁴_{June 26} reports four cases to prove the value of a method of treatment known to but few electricians, and which is the surest and safest means of bringing on absent menstruation. This is negative intra-uterine electrization, with currents of 30 to 40 millampères, for five minutes, the applications to be made about the time the menses are expected, if this time be known. These applications rapidly re-establish the menstrual functions by a complex action both upon the uterus and the ovaries, causing great congestion, and upon the nervous plexus which presides over the ovarian functions. It must be reserved for cases in which the amenorrhœa is only transitory, and depends either upon some fault of vitality in the ovary (obesity, premature menopause, retarded menstruation in young girls near the age of puberty), or upon a lesion of the ovaries (chronic sclerocystic ovaritis) or the uterus (chronic interstitial metritis, destruction of the mucous membrane by chloride of zinc, or by curetting, with or without the operation of Schröder).

It is evidently contra-indicated in cases of physiological amen-

orrhœa dependent on pregnancy, the menopause, or lactation, and is useless in cases following a severe disease of which it is but a symptom or sequela (chloranæmia, morphinomania, tuberculosis).

The intra-uterine application of the negative galvanic current, therefore, constitutes the most efficacious treatment known for amenorrhœa not dependent upon an organic irremediable cause; and we can only approve, in confirming it, of the conclusions of the author. [We would add, however, that, in rebellious cases, the action of galvanic currents may sometimes be powerfully aided and completed by sinusoidal currents, as recently proven by experiment in my clinic. One of the most marked effects of these sinusoidal currents is, in our opinion, that they favor the flow of blood, either during the menstrual period or outside of it.—Ed.]

OVARITIS AND OVARIAN PAIN.

In ovarian pain, as well as in chronic ovaritis, "which is not, properly speaking, an inflammation, but simply a state of hyperæmia with hyperplasia, determined in some cases by an affection of the uterus or the tube, and in others by excessive exercise, coitus, cold during menstruation, habitual constipation, etc.," Goelet, of New York, ⁷⁶⁰_{Aug. 20} recommends bipolar vaginal faradization, completing the sedative effect by vaginal galvanization, with currents of low intensity.

Blackwood, of Philadelphia, ⁷⁶⁰_{Aug. 20} declares himself an enthusiastic partisan of electricity in gynæcology, and passes in review the disorders in which it is superior to all other measures. Apropos of extra-uterine pregnancy, he expresses greater confidence in this treatment than in laparotomy. He states that thirteen cases, well authenticated, have been treated with perfect success. The embryo should not be regarded as a foreign body, to be extracted from an opening in the abdomen; this "foreign body" has never prevented the recovery of the patient. He employs faradization, first to kill the embryo, then to cause resorption.

CARCINOMA.

J. Inglis Parsons, of London, ²¹⁹⁰₉₀ attributes to the galvanic current a destructive action upon the cancerous cell. This action, according to him, has nothing in common with the electrolytic action produced on a level with the pole, but is manifested in the

entire interpolar zone, and is due to a quick break in the current, with reversal. The cancer-cells alone are destroyed, the healthy tissue remaining almost intact. He employs an electro-motive force of 105 volts, and from 10 to 600 milliampères, 50 to 100 interruptions being made, according to circumstances, in the same *séance*. The pulse and the respiration should be carefully watched. When the current is applied on the left breast, it may produce an electrical excitation of the heart.

The results are the gradual disappearance of pain; arrest of development of the tumor, which undergoes reduction and induration, the ganglia also becoming indurated; and also an amelioration in the nutrition and general state of the patient. The tumor does not disappear, but is reduced to an inert mass, apparently of fibrous tissue. This method has been tried by J. Prather, of Little Rock, Ark., ⁵⁰⁶_{Feb.} in four cases, three being cancer of the breast and one cancer of the uterus. He also employed it four times during the eight months preceding his report, in a case of carcinoma of the labia minor, and also in a case of suspected cancer of the neck of the uterus. In this last case, J. A. Dibrell had already performed amputation of the cervix. Prather hopes to resume his experiments and to make a more complete trial of the method when he shall have completed his electrical outfit. That which he had at his disposal did not permit him to go beyond 200 or 300 milliampères. The higher the intensity, in his opinion, the greater the efficacy in arresting the development of morbid tissue.

Robert Newman, of New York, ⁶¹_{Dec. 19, '91} read, at the first meeting of the American Electro-Therapeutic Association, a paper on the different methods employed in the electrical treatment of cancer. These methods are four in number: 1. Galvanism, which comprises the external application of the continued current by means of sponges, and the application of the interrupted galvanic current (Inglis Parsons's method). 2. Electrolysis, which permits of destruction of the diseased tissue by means of the chemical action of currents of high power (25 to 200 milliampères), or of resorption by means of weak currents (from 30 to 50 milliampères). 3. Galvano-cautery, by which method Byrne, of Brooklyn, in three hundred and sixty-seven cases, prevented recurrence in one hundred and fifty-three, during a period varying from two to eight years after the conclusion of the treatment. 4. A mixed treatment, which is

a combination of two of the preceding methods, especially of electrolysis with cauterization.

Wallace Taylor, of Osaka, Japan, ²⁰⁰_{Apr.23} reports four cases in which the cancer had reached such a state that the patients were beyond relief from therapeutics. He was encouraged to try cauterization by the example of Byrne, Nairne, and Martin, of Berlin (the latter, however, has since renounced the treatment in favor of the knife and sutures). His method consisted in removing the greatest possible quantity of diseased tissue by means of the curette and energetic cauterization of the denuded surface with the actual cautery, at the same time protecting the surrounding parts. Although in a deplorable condition before operation, none of the patients felt the least shock, and their general state was promptly improved. The cases were epitheliomata or soft cancer. Carcinoma and sarcoma are usually too dense for the application of this treatment; but in cases of this nature, in which it is possible to remove with the bistoury and the cautery all possible diseased tissue, the cure may be completed by means of antiseptic dressings. Although the author did not make use of the galvano-cautery, we speak of these cases here because of the great interest now felt in the treatment of cancer.

METRITIS.

G. Betton Massey, of Philadelphia, ^{2106 2158}_{Feb.10; Apr.7} reported two cases of metritis treated by means of electricity, accompanying his report by some interesting remarks tending to establish the fact that uterine deviations have not a primordial importance, and may persist without inconvenience to the patient after the cure of an endometritis, of which they are a symptom rather than a cause. Pessaries are of doubtful utility, and often augment rather than relieve suffering. The endometritis must be cured and the volume of the uterus diminished,—a double object marvelously accomplished by the combined use of galvanization and faradization. In the operative furor which has taken possession of surgeons of the present day, it often happens that the ovaries and tubes are removed, while the true disease is in the uterus itself. Endometritis is undoubtedly the most frequent affection in women who have borne children, and is far from being rare in virgins. It is the first of a series of morbid conditions which ultimately succeed it,—catarrhal salpingitis, pyosalpingitis, ovaritis, fibroma, displace-

ments, etc. Hence the importance of its early recognition and prompt cure. Even when the initial endometritis is no longer the only disease, but is complicated by extension to the tubes and ovaries; by utilizing the double action of the galvanic current by local application to the affected parts, and by a general application, as a reconstituent of the nervous system; by the addition to this internal and external electrical treatment of massage, diet, and repose, these cases may almost invariably be cured, unless there be suppuration, which is rarer than might be supposed. It is true that some weeks are necessary to obtain a cure; but it takes years for a patient to recover health after castration.

NEW INSTRUMENTS.

Lapthorn Smith, of Montreal,¹³⁰_{Feb.} describes a new flexible electrode for intra-uterine galvano-cautery, intended, according to him, to obviate the difficulty sometimes experienced in inserting Apostoli's rigid platinum sound the length of the uterine canal, rendered tortuous by the presence of several fibrous projections in its interior. The electrode consists of an ordinary rubber sound, around which, for about one centimetre from its olive-shaped extremity, a platinum, aluminum, or steel wire is rolled, which is connected with the positive conducting wire.

After trial, we still believe that a straight and rigid instrument is infinitely more secure and convenient than a curved or flexible sound.

Wallace A. Briggs, of Sacramento, Cal.,¹⁴⁷_{July} gives further details of an instrument previously described by him,¹⁴⁷_{May} which he uses for antiseptic cataphoresis, in the treatment of uterine and ovarian disease. This instrument resembles an ordinary hard-rubber syringe, with a first angle corresponding to the normal curve of the organ, and a second leading the base of the cannula toward the arc of the speculum. The metallic extremity of the cannula is connected, by means of an insulated conductor along the length of the syringe, with the base, to which is attached the other conductor. The instrument being in position,—that is, its metallic extremity being applied to the right or left horn of the uterus,—communication is established with the pile, and an antiseptic liquid is injected drop by drop,—iodide of potassium, camphor, creasote, iodine, etc. The author thinks that in the treatment of fibroma this method

assures complete antisepsis and permits the penetration of such substances as iodine and its compositions, which exercise an inhibiting influence on the formation of new tissue. He employs, by preference, the negative pole as the active agent.

Gehrung, of St. Louis, ²⁴_{Dec. 13, '91} presented to the Electro-Therapeutic Society of Paris a double cannula, insulated in its entire length, for the electrolysis of uterine tumors. The two principles upon which it is based are the employment of a tubular electrode, and the projection of liquids into the tumor and their removal by aspiration. It may be employed not only for fibrous tumors, but also for all other pelvic tumors, cellulitis, and pelvic abscess. The author first punctures the fibroma or cystic pocket at the most accessible point, either by the vagina or through the abdominal wall. The instrument is connected with the positive pole, a current varying from 50 to 100 milliampères being employed for from five to twenty minutes. The trocar being removed, the cannula is left in position for the escape of gas and liquids. A second cannula, placed in the body of the first, permits of lavage and injection of liquids, such as tincture of iodine, bichloride of mercury, etc. [The utility of such an apparatus appears to us doubtful in cases of solid tumors, the trocars at present employed seeming preferable.—Ed.] As to the treatment of liquid collections by the penetrating galvano-cautery, Tripier long ago formulated the technique for its employment. He applied it in 1878, in the treatment of cysts of the ovary, under the name of "ovariotomy." Besides this, the care taken by Gehrung to isolate the cannula in its entire length, in order to prevent tubular cauterization of the tissues which it traverses, renders his method dangerous, because of the possibility of diffusion of septic material into the peritoneal cavity.

A. H. Buckmaster, of New York, ⁷⁶⁰_{Dec. 19, '91} presents a new rheostat, resembling that of Bailey, with the exception that the blades are much larger, and, instead of being raised and lowered in the liquid, they remain fixed; the level of the water is raised and lowered at pleasure by means of a siphon and spigot, which lets the water run drop by drop. The force of the current is thus regulated insensibly.

GALVANO-CAUTERY.

J. Chéron, of Paris, ⁴⁸_{Mar., Apr., May, June} publishes an important study representing in reality a complete treatise on the application of

the thermic galvano-cautery. A detailed description of the instruments necessary is given, comprising the apparatus for the production of the current, such as piles, accumulators, various forms of galvano-cautery curettes (several of which have been invented by the author himself), spring forceps with parallel blades, which he uses for tumors (polypi or growths of all sorts) presenting a base of implantation too large for insertion in an ordinary galvanic loop without danger of breaking. The author considers the various applications of the galvano-cautery, giving cases of diseases of the anus and rectum, urethra, vulva, and uterus, capable of treatment by this method, and showing also its resources in the hands of modern gynæcologists.

ELECTRO-CHEMISTRY ; INTERSTITIAL CUPRIC ELECTROLYSIS.

Several communications were made by Gautier ⁷³_{Aug 20} to the Paris Electro-Therapeutic Society on his method of treatment by galvano-puncture in such diseases as buboes, adenitis of the neck, lupus, cystic tumor, hydrocele, etc. This method, to which he gives the name of electro-chemistry, interstitial electrolysis, etc., is but a renewal of attempts made by various operators, and with varying success ; among others, by Ciniselli, Steavenson, Onimus, Althaus, Groh, Beard and Rockwell, etc. For the intra-uterine application of the galvano-cautery, the author recommends electrodes of pure copper, which he considers superior to those of platinum. The chloroxide of copper generated by the positive pole plays a preponderant therapeutic rôle, according to Gautier, on account of its penetration into the surrounding tissues.

He assigns to copper the first rank among microbicidal agents, thus placing himself in opposition to other writers who have studied the question.

Miquel gives to ozone the first rank, compositions of copper occupying only a sixth or seventh rank in the scale. [It is probable that the good effects claimed by the author are derived, in reality, from the dynamic action of the electric current, rather than to the decomposition of the electrode used. Be that as it may, it is best to accept cautiously the conclusions which appear to us to be too hasty and based upon facts not yet sufficiently proven.—Ed.]

MEDICINAL ELECTROLYSIS.

Foveau de Courmelles, of Paris, proposes to make use of an electric current and a medicament, bringing their double action to bear upon the diseased part, producing a double electrolysis or bi-electrolysis. In short, the medicine and the diseased part react upon each other, their elements becoming liberated in their primitive chemical condition, producing more permanent results than by ordinary cauterization,—fusion of the tumor or cyst, disappearance of inflammation, metritis, blennorrhagia, etc.

The same author⁶⁹¹_{Sept.30} makes use of a needle and trocar for abdominal tumors, made of various metals, which he plunges into the tumor through the abdominal wall, and which enable him to introduce an electric current, the action of which is completed by the products of oxidation or chlorination of the metallic stem itself. It is, according to the author, a simplified bi-electrolysis. For uterine fibroma, iodide of potassium is injected into the uterus, and its decomposition by the electric current is increased by the action of the metallic needle (copper, zinc) introduced through the abdominal wall. He adds that "Bi-electrolysis is, moreover, of interest, in that it is often of use in diagnosis, as well as in the treatment of disease. Thus, in a case of metritis, we have the two methods of diagnosis and cure. The electro-diagnostic features of the method present this peculiarity,—that the continuous current gives rise to pain when it traverses the morbid part, producing either a slight pricking or burning sensation. Here apply to the part thus discovered either the induced current, by means of a special electrode, one part of which encircles the os and the other passes within it, or a stem-electrode of zinc with the continuous current, which will form *in loco dolenti* the caustic chloride of zinc, and constitute a form of electrolytic *cureage* or *curettage*, at once very simple and giving rise to very little pain."

VALUE OF ELECTRICITY IN MINOR GYNÆCOLOGY.

This is the subject of a very conscientious article by Edward Reynolds, of Boston, before the Fall River Medical Society.⁹⁹_{Apr.21} It is a methodical and judicial exposition of the subject, without enthusiasm, but with the conviction of the value of electricity in gynaecology, provided it be utilized in its different forms and according to the indications of each individual case. He presents

six cases in detail, carefully selected to bring out the respective effects of each pole, the interpolar currents, and faradic currents of tension or of quantity. Electricity, according to Reynolds, is not a panacea. It has its contra-indications; and if it shows less efficacy in inappropriate cases, it is hurtful and dangerous in those in which it is contra-indicated, or when applied in an incapable or maladroit manner.

We think, besides, that the results would often be more complete and satisfactory if the treatment were prolonged patiently, and if the patient could be seen several months after the treatment had been finished, in order to determine the anatomical modifications and symptomatic changes which had taken place. This would frequently cause surprise, and would totally modify the final result. This impression was strengthened by reading a paper by Henry T. Rutherford, of London, ²_{Apr. 9} on forty-two cases treated by electricity. In twenty-five of these treatment by the continued current showed more the efficacy of the method; and we do not doubt that the results would have been much better if, instead of abandoning the electric treatment after a few *séances*, it had been kept up for a longer time, varying its application and making use of both poles, if one of them had shown itself insufficient. Some of the cases were only treated three times,—none of them more than twenty-two times. One of them had been considered as a failure of the treatment, and hysterectomy had been advised. The patient, who passed from observation, returned at the end of a year and reported that her hæmorrhages had disappeared six months previously, and that her health had been notably improved.

The necessity for the electrician to thoroughly understand gynaecology, if he wishes to treat diseases of women; the primary importance of a rigorous diagnosis before instituting any treatment, and, as a corollary, the selection of the cases suitable for electricity, and those in which it might be injurious, are the chief points of an interesting paper by H. Bigelow, of Philadelphia, ⁶¹_{Dec. 12} entitled “Eight Months at the Free Dispensary for Women at Philadelphia.”

Seventy-five cases were treated during this period, of which 15 were fibroma, 5 specific purulent salpingitis, and 10 non-specific salpingitis and ovaro-salpingitis. About 600 galvanizations, uterine or vaginal, were made, either positive or negative, and 58

galvano-punctures, of which 45 were vaginal and 3 abdominal. There were no accidents. Of the 15 fibromata, 3 were subperitoneal; the others interstitial; none disappeared. Two were diminished in volume, and all the patients relieved; one of them, especially bad, was sent by the County Medical Society, having a large subperitoneal tumor, which twelve vaginal punctures had not much relieved, anatomically or symptomatically. Massey, collaborator of Bigelow at the dispensary, made three abdominal galvano-punctures which modified the form of the tumor and lowered it somewhat in the pelvis.

In a comparative study of the different methods of electric treatment applicable to gynaecology in general, and to fibromata in particular,—that is, methods based upon the use of galvanic currents or electrolysis on the one hand, and the use of induced currents, or without electrolysis, on the other,—Mally, of Paris, ⁴⁸Nov., '91 declares himself a partisan of the latter. The advocates of the electrolytic method are mistaken in attributing all the therapeutic effects observed to intensity and to dosage, by means of the galvanometer. Nothing is less justified. The introduction of electric measurements in therapeutics is still too new to afford us any useful indications as regards treatment. Electro-physiology shows us how to conduct electricity through the tissues. The products of electrolysis do not appear except by contact with the electrode, never in the interpolar portion of the circuit. To claim, as does Apostoli, that the interpolar action varies exactly according to the precise intensity used, seems strange, to say the least, when it concerns an action so vague and uncertain in its results that it could never be made subordinate to an absolute mathematical formula. Even at the poles the products of electrolysis are not uniform, varying according to the nature and vitality of the tissues concerned.

On the other hand, the direct action of electricity upon microbes is still to be demonstrated. If a perceptible action has been observed in the experiments undertaken, they can only be attributed to a chemical cause.

Finally, the continued current may be dangerous, while the induced current, on the contrary, is characterized (1) by an action chemically *nil*, at least as far as concerns the accumulation of the electrolytic products at the poles; (2) the sudden variations in intensity are eminently favorable to bring into play the

contractility of the muscular fibre and the excitation of sensitive nerves. This appears to Mally to be sufficient to justify his choice of the method. At a meeting of the American Electro-Therapeutic Society, at Philadelphia, W. Poole read a paper giving a new theory of the action of the electric current in gynaecology. He does not deny that this theory is a complete contradiction of those authorized by the physiologists of the Continent, but he does not hesitate, at the same time, to accuse them of a want of exactitude.

In cases of chronic inflammation of the uterus and its adnexa a current of from fifty to one hundred milliampères causes a notable increase of pain, sensibility, tumefaction,—in a word, an aggravation of all the symptoms. Even outside of diseases of the pelvis, when galvanic currents are applied to the spine for the treatment of medullary affections, it is not rare to observe that the menstrual period is brought on prematurely. In order to explain this phenomena, it is generally admitted that the galvanic current possesses an excitant action capable of augmenting the hyperæmia, such as is observed in the first stage of inflammatory processes,—a resemblance more apparent than real.

How can this excitant action be made to accord with the sedative effects of the galvanic current upon pain and nervous excitability? How can it be made to accord also with the theory that, under the influence of the galvanic current, the vasomotor centres undergo an excitation which is followed by constriction of the calibre of the arteries? Certain authors admit that electrization of the genital centre in the lumbar region of the spinal cord, or of certain nervous trunks at their point of exit, leads to dilatation of the pelvic arteries.

It would seem, then, that two opposite actions may arise under the influence of the same excitation. The one, congestive hyperæmia, giving rise to the same effects as are observed when the vascular system is removed from the influence of the vasomotor centre of the spinal cord, either by destruction or section, or by section of the nervous vasomotor trunks, as paralysis, relaxation and permanent dilatation of the arteries; the other, on the contrary, conforms with the fact, generally observed, that in any region excitation of the vasomotor centres leads to contraction of the arteries, and, consecutively, to anæmia of that region.

According to the author, the arrest of function of the vasomotor centre, by section of the spinal cord or the large splanchnic trunks, or by paralysis from want of oxygen in the blood, leads not to dilatation and relaxation of the arteries, as has been supposed from an incorrect interpretation of facts observed, but, on the contrary, to their contraction, the natural result of true activity of the muscular fibre. By their contraction the arteries are emptied, and the blood is driven into the venous system. An identical result is obtained, either directly or by a reflex action, by the application of the electric current. It is due to the cessation of nervous action upon the involuntary muscular fibres, a phenomenon of paralysis. The electric current is also a paralyzing agent which thwarts the nervous activity; the same may be said of strychnia, ergot, and atropia, which also cause contraction of the arterioles.

It is by basing himself on these grounds that Poole explains the clinical facts observed in gynæcology. A moderate action of the circulatory current determines an increase in arterial tension, and with it all the good effects which result; but, if the blood be driven in excess into the veins, notably in cases of congestion and inflammation, pain, tumefaction, and aggravation of all the symptoms occur. The author concludes by expressing the hope that this theory, so contrary to the one generally held by physiologists, may be seriously examined by means of experiments in the laboratories of the New World, and that the results of these experiments may prove him to be correct.

UTERINE FIBROMYOMA.

The curative origin of the galvanic method as applied to the treatment of uterine fibromyoma is discussed by Danion, of Paris.¹⁰
Apr. 28 He claims to avoid the caustic action of the current, which he condemns as dangerous. It is to some unusual phenomena of chemical electro-cautery that he attributes the curative action of the galvanic current; that is to say, "to electro-tonic contractions and to profound electrolytic modifications, which, while arising from the same principle as electro-cautery, differ from it essentially."

Many and interesting are the communications constantly appearing which go to swell the favorable statistics already pub-

lished of the treatment, by high intensities, as praised by Apostoli, and become, one might say, classic. In spite of their great interest, these papers are too numerous to be analyzed, and we must content ourselves with merely alluding to the most important of them. Three cases of fibroid tumors of the uterus were treated by the negative current, and symptomatically cured, with reduction of volume, by A. G. Henry, of Cortland, N. Y. The conclusions of T. M. Wright, of Troy, O., ⁵³_{Sept. 17} conform to those of operators in general. Two cases, successfully treated by weak currents, are reported by J. A. Lyon, of Chicago. ¹⁰⁰³_{Nov., '91} George Keith, of Brooklyn, ²⁰⁵⁸_{Sept. 22} discusses the treatment of tumors of the uterus by electricity in England. Five cases are reported by Betton Massey, ²³⁴_{July} who also reported an unfavorable case to the Philadelphia Obstetrical Society. ¹⁰⁰³_{Dec., '91} This case was complicated by a suppurating tumor of the adnexa. The patient was operated on by Baldy, and died three days after operation. The case is of special interest as confirming the rule advanced by Apostoli, as to electric intolerance in cases of suppurative inflammation of the adnexa. This intolerance was here very manifest, since intra-uterine applications not exceeding 30 milliamperes provoked violent and painful reactions. The patient was then submitted (wrongfully, in our opinion) to vaginal puncture, of a strength varying from 100 to 200 milliamperes, under chloroform. The result was, that an acute inflammatory condition, with abscess, was brought about. It was then decided to operate on the patient. This case carries with it a lesson that should not be lost sight of, namely, that the tolerance of the patient should always be considered, and that it is not safe to pass beyond it.

A. E. Aust-Lawrence and W. H. C. Newnham, of London, ²_{Nov. 23, '91} give notes of several cases treated by Apostoli's method, by Wladislaw Harajewicz, of Cracow. ⁷³_{Aug. 20} This author has applied the method with much success in several patients, reporting three very conclusive cases,—a fibroid tumor of the uterus adherent to the uterus, adherent to the pelvic walls; dysmenorrhœa, complicated with ante flexion and cervical stenosis; gonorrhœal endometritis with consecutive salpingitis. Twenty cases, treated by Apostoli's method, are reported by J. Inglis Parsons, of London. ⁶_{Feb. 27, '91} Total disappearance of a tumor was obtained in a case of Skene Keith's. ²_{July 9} The modern treatment of uterine fibroma

was discussed ² Nov., Dec., '91; Jan., Feb. by James H. Aveling, W. J. Sinclair, John W. Taylor, and Macpherson Lawrie, giving the weight of their authority and personal experience to the electric treatment, and replying to fresh attacks made by Lawson Tait.

Equally favorable are the statistics of twenty-five cases by Broese, of Berlin. ³⁹³ _{B.23} Of these twenty-five cases treated, with great hæmorrhage, twenty-one remained free from hæmorrhage three years after treatment. There were two failures. Hæmorrhage is the principal indication for electric treatment. Symptoms of compression due to the size of the tumor and concomitant dysmenorrhœa constitute the second indication; and in these cases the negative pole must be employed. In forty cases Schaeffer saw the tumor entirely disappear in a single instance.

At the Obstetrical and Gynæcological Clinic of Chrobak, of Vienna, electricity was experimented with in 1889 by Ludwig Mandl and Joseph Winter, who publish an important study upon the subject. ⁸ _{Nos.51,52,91; Nos.3,4} They used Apostoli's method, making 900 applications. No accidents occurred, either during or after treatment. Ninety-four cases were treated, as follow: Endometritis, 44 cases; myoma, 17; dysmenorrhœa, 4; subinvolution, 2; amenorrhœa, 11; pedicular exudation after extirpation of the adnexa, 6; perimetritis and parametritis, chronic inflammation of the appendages, 6; pruritus vulvæ, ovaritis, enuresis, retention of urine (vesical paresis), each 1 case.

The following is a *résumé* of their work and their conclusions: Intra-uterine electrotherapy requires the same amount of gynæcological knowledge as other methods of intra-uterine therapeutics. It is not dangerous if practiced with asepsis. The maximum measure, and the most exact for dosage, is the reaction of the patient. On account of asepsis, it is well to locate the cervix with the speculum and introduce the sound under control of the eyes. The intervals between treatment must always be from three to four days; exceptionally, in cases of great hæmorrhage, it may be reduced to two days. If the *séances* be repeated too often, or the current be too strong or too prolonged, there is danger of causing symptoms of violent reaction, on account of the insufficiency of the lymphatic apparatus for the elimination of the products of disintegration or their too rapid absorption.

The polar action of the intra-uterine electrode differs from that

of all other cauteries, in that a certain part of the tissue decomposed into gas acts upon the neighboring tissue, causing scarification ; so that but a small portion of the tissue really destroyed is transformed into an eschar. This small mass, its chemical constituents, and the slight mechanical lesion (always less than that of other therapeutic measures) explain the weak reaction. Repeated application of the positive pole is a sure method for the cure of true endometritis, such as that accompanying myoma. It is indicated even when there is a chronic periuterine inflammation, although only a weak current must be employed. It is suitable in all forms of endometritis, excepting those complicated by acute periuterine inflammation. A rheostat is of service to enable the current to be augmented or diminished as needed.

The authors disapprove of galvano-puncture, although believing it less dangerous, since the depth, instead of being from ten to fifteen centimetres, is not to-day more than one-half to one centimetre. "Nevertheless, almost all authors employing galvano-puncture state that it accidentally produces pain and fever. Necrosis of the swollen parts frequently observed, symptoms of grave periuterine inflammation, the ever-present possibility of secondary infection along the path of the puncture, to say nothing of lesions of neighboring organs, constitute the dangers which are not always avoided by the operator, no matter how careful. A conservative method which, besides requiring a great armamentarium, calls for repeated anæsthesia, repose in bed for several days, and which, above all, is not exempt from danger, does not merit preference to surgical treatment. For this reason we do not believe, although rapid diminution in the size of the tumor may often have been observed after galvano-puncture, that it is to be of much future value."

This fear of galvano-puncture is not shared by Betton Massey, of Philadelphia, ⁹_{Feb. 6} who declares himself its decided partisan, not only by the vagina, but by the abdomen, although he was opposed to the operation when first introduced. He invariably employs the negative current for puncture through the abdominal wall. He prefers Hagedorn's straight needles, because of their ease of insertion and their lightness. They must be covered with an isolating material up to within half an inch of their extremity, carefully sterilized and asepticized, as well as the cutaneous surface into

which the punctures are to be made. The current should be from 60 to 100 milliampères for from six to eight minutes. He has never observed any accidents, and is convinced that this method will render the best service in cases of large fibroid interstitial and subperitoneal tumors, which at the same time are not accessible except beyond the pubis. The cases treated in this way are still too recent to permit of definite conclusions. We must, besides, call attention to the interesting articles of Cauchois, of Rouen ²⁰³_{Aug.1}; Walter L. Burrage, of Boston; Nagel, of Berlin ²⁶_{Apr.1}; D. J. Prather, of Little Rock, ¹⁹⁶_{Jan.} and A. H. Goelet, of New York. ²¹⁹¹

CLIMATOLOGY, BALNEOLOGY, AND HYDROTHERAPY.

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CLIMATOLOGY.

No work of any magnitude has appeared this year on medical climatology, although the subject has been extensively treated in various essays and in numerous journals.

An interesting study of the effect of mountain climate on the human race in general is made by W. C. Van Bibber, of Baltimore.⁴⁸³ Feb. He gives an account of the population of the great Piedmont and mountainous regions of the South. Both the Indians and whites of this region form a population of intelligent and powerful men and women, whose physique and characters seem to be influenced by the pure air and ennobling scenery surrounding them. Among the natives there is an absence of consumption and malaria, and, while the climate is not recommended for the cure of any special disease, it is claimed to be valuable in maintaining the strength of healthy and vigorous persons. Von Ruck, of Asheville, indorses Van Bibber's statements, but does not agree with him that this region, which produces such a vigorous race, cannot be made use of in arresting or curing consumption.

Alward White, of El Paso, Texas,¹⁰⁵⁴ Sept. dwells on the effect of climate on phthisis, and points out that, in cases suffering alike, salutary results in the same degree are often attained by subjecting them to extreme opposites of climatic influences. Thus, one of two patients in the same stage of the disease is sent on a sea-voyage, the other to an elevated mountain region; both are benefited. In explanation of this, the writer seeks for the conditions common to both localities. This common factor, he maintains, is the aseptic condition of the atmosphere,—aseptic both on the sea and on the mountain height, both aseptic and antiseptic on the sea. The

parallel is almost complete between the conditions found in the primary stage of phthisis and those encountered in the treatment of *non-infected* wounds. It is acknowledged that in the second and third stages of phthisis it is on the sea that the patient derives the most benefit.

The effect produced on the nervous system by tropical climates has been analyzed by F. Blanco Gonzales.⁹¹⁷_{May} The first effect of the warmth and light on the skin is, by reflex action, to stimulate the entire nervous as well as circulatory system. After a time, however, a feeling of apathy creeps over the individual; the mucous membranes become dry; oxygenation goes on in a deficient manner, until later he becomes irritable and, finally, even debilitated.

Alward White, of El Paso, Texas,¹⁰⁴_{Sept. 24} classifies the pathological conditions which are more successfully treated at high altitudes and those on which altitude has no effect. Under the former climatic conditions, all affections of the heart, either nervous or organic, are aggravated. Conclusions drawn by Veraguth⁵⁷_{May 8} as to the effect of altitude on cardiac troubles are much more favorable than White's observations. According to the former, St. Moritz has a most beneficial effect on heart affections; and digitalis, he says, is not to be compared to the good results of high altitudes in cases where compensatory hypertrophy has not taken place. If, however, the heart-muscle has degenerated and dilatation has taken place, harm can only result from remaining at such altitudes.

White also maintains that high altitude has an injurious effect on diseased conditions of the bowels, liver, bladder, stomach, and kidneys, for the reason that below the thorax the venous circulation is retarded where there is diminution of barometric pressure. Rheumatism and gout seem not to be affected in one way or another by altitude, while acute infectious diseases are modified, run a shorter course, and convalescence is more rapid.

W. A. Jayne⁴⁸³_{May} also finds that diphtheria in high altitudes is less severe than on a lower plain, or at the sea-level, if the sanitary surroundings be the same. This theory is based on statistics taken in a mining village among the Rocky Mountains during an epidemic of diphtheria. Out of sixty-eight cases, 25 per cent. recovered, which, compared with death-rates given by Loomis and Morell Mackenzie, shows a low mortality. Of those who re-

covered, a rapid convalescence was noted, and an almost entire absence of sequelæ. Edmund J. A. Rogers, of Denver, ⁴⁸³_{May} emphasizes the point that moisture is an active agent in the propagation of diphtheritic germs; that it often develops with the melting snow; and that the only disease that has not abated in Colorado in the past unusual wet season is diphtheria. Nevin B. Shade, of Washington, D. C., ¹⁷⁶_{Aug.} prefers the sea-side for the preparatory treatment of all forms of chronic diseases, and finds that, the greater the altitude, the more stubborn will the glandular system be to treatment. After a course of treatment at the sea-shore, he advises that the patient be sent to a higher altitude, as the reaction is beneficial in all cases, and particularly in the tubercular diathesis.

In an analysis of one hundred cases of phthisis pulmonalis, made by S. A. Fisk, of Denver, Col., ⁴⁸³_{Jan.} showing the effect of the climate of Colorado on the disease, he finds improvement in two cases out of three. His observations also show that men do better than women, that under 20 they do not do well, and between 28 and 50 the chances of recovery diminish as they get older. Fisk's conclusions are corroborated by Solly, of Colorado Springs, who, out of one hundred and forty-one observed cases, also finds that two out of three receive benefit by going to Colorado.

A. Hoessli, of St. Moritz, ⁶⁹_{Sept. 15} gives an instructive account of his method of treating children. The history of a 7-year-old child, suffering from catarrh of the air-passages, is detailed at length, but it is evident that the result is due to the method rather than to the altitude. He believes in keeping the children out-of-doors as much as possible, allowing them to play about, rather than to keep them in-doors and depend on drugs. Hoessli also refers to his treatment of chlorosis and anæmia at St. Moritz, but does not expect to make much headway unless the treatment can be prolonged. As he well says, such patients never take regular exercise: from childhood up they are weak and pale. They do not eat to live, but simply in order not to die. Hoessli's first object is to improve their general condition by teaching them how to live in a sensible and hygienic manner. After this has been accomplished (and it requires from two to three months), he begins to give them regular exercise in the open air. He does not agree with those who claim that the Alpine heights are too cold for suf-

ferers from anæmia ; he does, however, acknowledge that, at first, such patients find their symptoms aggravated, but soon improve, and those who pass through this preliminary stage quickest improve the most. Hoessli devotes also a few lines to the treatment of neurasthenia, but is obliged to confess that patients suffering from this disease do not always do well in high altitudes.

Mountaineering,⁶ Aug. 27 carried on under proper rules and guidance, is not necessarily dangerous. But there are many persons who should never attempt the severe undertaking, viz., the senile,—not the senile in years only, but in vessels and tissues. The sedentary men, with flabby heart and muscles, are the ones about whom annually are reported such deplorable accidents. They undertake feats which should be reserved for the mountain adept, and the results are often acute dilatation of the heart, rupture of a blood-vessel, and either sudden death or life-long enfeeblement. The patient with incipient phthisis, or with chronic pleurisy, or an imperfectly resolved pneumonia, may most advantageously undertake moderate climbing. Highly neurotic persons do not make good climbers, partly because the keen mountain-air excites the nervous system, and partly because their self-command may desert them at some critical point.

The climber should start early in the cool of the morning, take a light breakfast, wear the thickest of clothing, gloves, and boots. Foot-soreness must be guarded against by soaping the stockings, and, on the first appearance of irritation, the application of a weak whisky lotion is recommended. As to food *en route*, each traveler must be a law unto himself, many climbers doing best on a light meal, and others needing a fairly substantial midday luncheon and a moderate allowance of wine.

Ocean holidays are recommended as the best means of repose and restoration to the overwrought² Apr. 9; but the great danger is in hurrying about from one place to another, and so degenerating into the veritable “globe-trotter.” If good accommodations could be found on a sailing-vessel, nothing could be of more benefit to many invalids than the quiet routine, the absence of daily responsibilities, the salt air, and the constantly renewed draughts of oxygen which a long voyage would render possible.

C. T. Williams, of London,² Mar. 19 considers meteorology as the basis of all sound climatology. We are unable to judge of the

qualifications of a place as a health resort from its latitude and longitude alone. We must know all about its climate as tested by the most modern scientific instruments, such as the thermometer, barometer, anemometer, hygrometer, and sunshine-recorder. If the climate of a certain place is equable, we ought to know the cause of the equability: whether it is due to the nearness of the sea, or to a large amount of moisture in the air. Madeira, for example, on account of its ocean environment, has a mean daily range of temperature of only 11° F. (6.10° C.), while Cairo, a dry, inland climate, has a mean daily range of double that. In the latter place there is no marine influence to check the fall of temperature by radiation, though the Nile does exert some modifying influence. In the desert the maximum winter temperature may be 83° F. (28.3° C.), and the minimum 38° F. (3.3° C.) in the same twenty-four hours. Sunshine-recorders give us information as to the daily allowance of out-door life possible,—information which is most valuable for one in search of a proper health resort. At such high stations as St. Moritz and Davos, chilly consumptive patients are enabled to sit out, surrounded by ice and snow, because the sun's direct rays, shining through an attenuated atmosphere free from mist, are even more powerful than in low, level stations farther south, where the atmosphere is at ordinary pressure; but when the sun sets or is obscured, then Arctic temperature prevails in these localities of high altitude.

After glancing at certain climatic peculiarities which no observations on temperature, hygrometry, or barometric or wind-pressure have fathomed, the writer adds that no meteorological instrument has been able to inform us accurately why this climate is active, and that one sedentive; why a patient loses his appetite here, and regains it there; why an asthmatic breathes freely in one place, and lives in misery in another. But there is, therefore, the greater need of workers in this field, and for a more complete analysis of the air of health resorts, and especially during periods of epidemics, as well as careful observations with the spectroscope. Chemistry and physics must come to the aid of meteorology.

In some hints concerning the duties of health-resort doctors, as well as the "home doctor," J. M. Keating¹⁸³_{Apr.} points out the importance (1) of ascertaining the necessity of sending the patient away from home at all; (2) the choice of the place, as regards

climate, sanitary conditions, etc.; and (3) the necessity of the doctor at the health resort being more thorough than he is at present, if he wishes to place climatology upon a strictly scientific basis. His enthusiasm must not carry him away. Statistics must be given from which one can draw his own conclusions, and all statements must be substantiated.

A. Barry Blacker and R. H. Clark, of London, ¹⁵_{Apr.} claim that sunlight is the one indispensable factor in every climatic cure, although almost all other conditions vary. They cite a peculiar treatment of chronic diseases by light, air, and water, as given at Veldes, a village in the Austrian Alps. The daily programme which a male patient undergoes is as follows: He rises with the sun, between 4 A.M. and 8 A.M., according to the season, and prepares to take his first "air-bath," provided with a flask of milk and 6 ounces (186 grammes) of Graham bread and a small jar of honey. Clothed lightly and with bare feet he begins the ascent of the hill where the "air-bath" is taken, the rest of his attire being removed as he walks on dewy grass and through fir plantations, till at last the summit is reached in a state of absolute nudity. After having partaken of the frugal repast with which he has provided himself, and having amused himself with reading, running, and with various games with his fellow-bathers from one to three hours, he descends, clothing himself by degrees as he approaches the inhabited regions below. On reaching his hut he rests until he takes his "sun-bath." While taking these baths the patients lie in a row, on the roof of a wooden house, hidden from the gaze of the curious by a high fence, the entire body, with the exception of the head, being exposed to the light of the sun. After roasting from twenty to sixty minutes, turning from time to time, to expose completely the surface of the body to the light, and in order that the body may not become too extensively blistered in any one portion, the patient is wrapped in a thick blanket and left in the sun for another ten minutes, the result usually being a profuse perspiration. He is then carried to a water- or steam-bath, and roughly rubbed by two attendants for five to ten minutes.

Will F. Arnold, U. S. N., in referring to light as a factor in the treatment of disease, ⁸⁶_{Sept.} speaks of the salutary effects of direct sunlight on animal life in general, as well as the concentrated rays of the sun as an agent for immediate vesication. In Peru this

theory is carried out in an establishment where syphilis is treated by the enforcement of a very meagre diet, and profuse diaphoresis induced by covering the patient with hot sand, until great reduction in weight results; then prolonged exposure to the sun's rays is practiced, with as little protection to the patient as is consistent with humanity. No alterative medicine is used. Investigators of this mode of treatment warmly commend the results secured.

W. Jaworski, of Warsaw, Poland, in a personal communication, comparing the results of treatment of phthisis in the well-known sanatoriums of Broehmer, Dettweiler, and Turben, where patients are kept under strict personal supervision, with others where patients have more freedom of action, notes the superiority of the stricter methods. Besides the medical advice received, the patient should also be instructed as to the mode of life, climatic treatment, etc., to be followed after leaving the sanatorium.

Full tables of temperature, humidity, and wind-pressure of Florida are given by J. P. Wall, of Tampa, Florida.⁴⁸³ Wall also praises the healthfulness of the sea-coast of Florida. In spite of the malaria of the swamps of the interior, there is almost an immunity from fever on the coast. He shows by statistics that the percentage of mortality for the whole peninsula is less than that of other portions of the United States. A great advantage which Florida has over other States frequented by invalids is the splendid hotel accommodations it enjoys.

A valuable article on Southern California, by H. S. Upson, of Cleveland,²²³ notes the fact that, on account of the long, dry season,—from May to October, when no rain falls,—there is no malaria in most portions of Southern California. At Santa Barbara the northeast winds are cut off by the mountains. The invalid must not, however, expect a climate free from catarrhal and neuralgic tendencies. The moist air from the Pacific, the occasional heavy fogs, and the great range of temperature between day and night,—in November a change of temperature from 90° to 45° F. (32.2° to 7.2° C.) was noted in one day,—all make the danger of taking cold considerable. On the whole, the writer considers Southern California both overrated and underrated, and he finds the verdict of people who go there to differ in the extreme.

Upson also dwells on the advantages of camp-life for the first indications of consumption. He finds that there is something partic-

ularly bracing and health-giving in camping which is not gained by a house-residence. He recommends as good localities for camping the Adirondack Mountains, the Lake Superior region, and the Rocky Mountains, especially Wyoming and Colorado, where the dryness of the air makes it possible to spend the whole night out-of-doors, with no covering other than a blanket; also the high Sierras.

W. E. Edwards, of San Diego,⁴⁸³_{Sept.} predicts the probable alteration of the climate of Southern California, as the result of the formation of a new lake in a former desert of that region. The effects on the climate by this new, large body of water may be a damper summer and a colder winter.

Notes on the climate of Death Valley, California, made by M. W. Harrington, Chief of U. S. Weather Bureau, are reviewed by Guy Hinsdale.⁴⁵¹_{Sept.} This remarkable valley is about seventy-five miles long, and is shut in by bold ridges of mountains, the Sierra Nevada separating it from the Pacific slope. Its extraordinary depth,—more than one hundred feet below sea-level,—its heat and dryness, and the fate of explorers who have perished from thirst within its limits, have invested it with much interest. It is so arid that few plants and, among animals, only horned toads, snakes, and lizards are able to survive. The temperature in 1891 rose to 122° F. (50° C.) in the shade. The air is not stagnant, but actively in motion, the heat being increased by occasional hot blasts from the south. “Small and concentrated storms of the utmost fury gather about the mountains in hottest weather. An ominous cloud forms with great speed, grows black and full of lightning, sags down to the mountains, and releases a flood of water.” Forty men were employed for five years in the borax-works located in this valley, and they considered its climate healthy with an inch or two of rain-fall. The five months of summer are so hot and arid that men, exposed to the heat of the sun’s rays, have not infrequently been driven insane.

The climate of Southern Arizona is highly praised for invalids by J. T. Green, of Tucson,⁴⁸³_{Nov., '91} who defends it from the numerous accusations of dust-storms, intense summer heat, and the great change of temperature between day and night. The writer speaks of the freshness and newness of the towns and buildings, unpolluted by the exhalations of diseased humanity.

Not only the cities, but the many ranches offer homes to the invalid that, from the manner of life alone, would give health to many who die annually from a disease which exercise in pure, dry air will cure. On the other hand, Thomas Darlington, of Bisbee, Arizona,⁴⁸³_{June} questions the expediency of sending patients with wasting diseases to the dry climates usually recommended, and cites the following instances of great diurnal variations of temperature: "One may be riding in December in Southern Arizona, with the sun so hot as to necessitate the removal of the coat; and, then going under a cloud, we may even have a flurry of snow, so great is the change." On December 24, 1889, while riding at midday, the writer's thermometer registered in his vest-pocket 109° F. (42.77° C.), and that same night nearly two inches of ice formed in the horse-trough. Owing to an excess of vapor thrown off by the lungs and skin, the mucous membrane of the mouth, nose, and fauces becomes dry, and may become fissured; the rapid evaporation of water leaves a large quantity of mucus behind, and this, becoming inspissated, plugs the secretory ducts and impedes their functions. Pharyngitis and tonsillitis are very frequent. Chronic rhinitis is general. The same causes commonly produce otitis and deafness. The liver acts in a sluggish way, and the urine is of high specific gravity, averaging 1028. It is not uncommon, especially in hot weather, to find persons who urinate only once or twice a day, though it is more common to find those who suffer from a slight cystitis, on account of the concentration of the urine, and who have an almost constant desire to urinate, though they pass but little in quantity. For this reason, also, the kidneys become irritated. Very obstinate constipation follows. The writer also calls attention to the general loss of body-weight. Among fifty-eight persons of whom inquiry was made relative to the loss sustained, but one had gained.

Nevin B. Shade, of Washington,¹⁷⁶_{Aug.} prefers Ocean Grove, N. J., to all sea-side resorts for invalids for one reason in particular, viz., the drainage is so perfect that there is not sufficient evaporation from the earth's surface to germinate an animalcule, and the result is, that Ocean Grove is free from the pestiferous insect,—no flies or mosquitoes.

Boardman Reed, of Atlantic City,⁹_{Oct.19} finds that many physicians advise their patients against staying in Atlantic City during

the autumn months. This prejudice, he thinks, can only be explained by the faulty condition of the water-works as they previously existed. As reference to the ANNUAL of 1891, vol. v, D-20, will show, an entire new system of sewerage and water-supply has existed in Atlantic City since 1885. He says that, during his fifteen years' residence there, he has never seen a case of malarial disease which could have been suspected of originating in Atlantic City. Moreover, the autumn months there are the most delightful of the year, being particularly equable and balmy. The thermometer seldom falls below 60° F. (15.6° C.) in November at midday.

To the sportsman who seeks a climatic change, W. F. Waugh, of Philadelphia, ⁷⁶⁰_{Aug. 20} recommends Bedford Springs. It abounds in game, and would give just enough pleasant occupation to the man who finds he needs exercise while sojourning at the springs and drinking its waters.

A most charming account on "Wintering in Egypt," by Frederick Peterson, of New York, ⁵⁹_{Aug. 20} describes the country, the best way to get there, and the climate of Cairo, Damietta, and Alexandria. In none of these towns is it desirable for an invalid to take up his winter quarters. Helonan, fifteen miles from Cairo, and Gizeli, seven miles from Cairo, are both recommended to the seeker after health; but Luxor, situated four hundred and fifty miles south of Cairo, with 4000 inhabitants, two good hotels, and an English doctor, is dryer, warmer, and sunnier than any other Egyptian resort. The author describes in glowing terms the pleasure and health to be derived from a trip on the Nile in a house-boat (dahabeeyeh), and advises the traveler about the best means of procuring them, routes, etc. He also suggests camping in the desert as beneficial and agreeable for the consumptive in Egypt. The absolute certainty of warm sun and rainless days, and the means of carrying any quantity of necessities and luxuries on the camel, give advantages to camp-life in Egypt over that of America. The rain-fall in Cairo, Helonan, and Gizeli is a trifle over one inch annually. Rain in Luxor is almost unknown. Showers are noted once in 1878, 1882, 1887, and a three-minute rain in 1888. Dew is always present in Lower Egypt, along the Nile, and in the desert near the Nile. At Luxor dew is almost unnoticeable. Humidity is least in June. The average annual relative humidity is 58.4 in Cairo, Helonan, and Gizeli; but for the seven

months frequented by invalids (October to May) it is 63.2. Luxor is much dryer than Cairo, the average being 12 to 15 per cent. less. Clouds are not infrequent at Cairo; at Luxor almost unknown. The prevailing wind in Cairo is from the north; in January, from the southwest. For the seven winter months the average force is 2.3. At Luxor the average force is exceedingly low,—0.9. None of the winds in Egypt are uncomfortable, except the khamseen from the south or southwest. It blows for three days, as a rule; is very hot and dry, and the air is usually filled with a fine sand.

The water of the Nile, if filtered, is inferior to none in the world for drinking purposes. Diarrhœa is common among the natives. Typhoid fever, typhus, measles, and relapsing fevers are not infrequent in the overcrowded, filthy quarters. Forty deaths occur annually from small-pox in Cairo. Pleurisy, bronchitis, and pneumonia are frequent, but only from a careless exposure at night. Malaria in a mild form is prevalent along the river in the warm months. Entozoa disorders are common, and ophthalmia is extremely prevalent among Egyptians, but foreigners seldom suffer from it. Scarletina, whooping-cough, and mumps are very rare; while consumption is almost unknown. Acute rheumatism, gout, and rheumatic arthritis are also practically unknown in Egypt. Peterson has previously called attention, in an article on "Insanity in Egypt," ⁵⁹_{May 21} to the phenomenal rarity of insanity, and to the entire absence of paralytic dementia among the Egyptians. Egypt, with 6,000,000 inhabitants, has but one insane asylum, containing 250 inmates, whereas New York State, with the same population, has over 15,000 insane in its numerous asylums.

The climate of Egypt is invaluable in all kinds of chronic diseases of the respiratory organs, for delicate lungs or incipient phthisis, for rheumatic affections, for convalescents from any acute disease. Moribund phthisical patients, or invalids with apoplectic tendencies, should not be sent to Egypt. Camp-life in the desert, or a voyage on the Nile, would doubtless be valuable in many forms of nervous and mental diseases, and there is no better climate for intractable rheumatic and malarial neuralgias, sciatica, and the like than the sunny land of Egypt.

In giving directions for going to the Cape of Good Hope, J. A. Ross, of Folkestone, ⁶_{Sept. 10} advises the patient to leave England just

in time to escape the winter there, and he will arrive at the Cape at the beginning of the long summer. As dryness of air and soil and altitude are of the first importance to the phthysical invalid, he advises such a one to proceed at once to the high-lying inland localities having mountain-ranges between it and the sea to intercept moisture. The summer at the western side of the Cape is dry, and a patient may spend some time at Ceres, a village pleasantly situated, 1500 feet above the sea, at the head of a fine pass; or at Matjesfontein, 2600 feet above the sea, situated in the midst of a dry, arid desert, but on this account very suitable. As a permanent place of residence, Bloemfontein, or Aliwal North, the writer thinks, would yield the best results. Both places can be reached by train from Cape Town, Port Elizabeth, and East London. Bloemfontein is the capital of the Orange Free State (4500 feet), and has a very dry temperature. Its mean maximum temperature for the four warmest months is 85° F. (29.3° C.), and for the year 76° F. (24.4° C.). Aliwal North (4300 feet), on the Orange River, has a similar climate, and has sulphur-baths in close proximity. Ross has sent patients to both places with excellent results. He has had phthysical patients in whom the disease advanced during a residence at Davos, and who improved greatly on these inland plateaux.

M. A. Lancaster, of Brussels, ²⁰⁶⁸₉₁ calls attention to the fact that the mean temperature of Belgium during nine months of last year was below normal, and in the other months a little above, while during the last seven years the mean temperature of all the months, excepting November, ranged below normal. This is a condition of affairs which must be considered noteworthy, and which is explained by the fact that during these seven years the prevailing winds have been from the north.

Davos has been referred to frequently in former issues of the ANNUAL. It is in the Swiss Engadine, and one of the favorite Swiss health resorts. J. E. Graham ³⁹_{Sept. 1} adds his favorable opinion of the place to the many others that have been given. From 1500 to 1600 patients visit Davos every winter; and those who derive the most benefit are in the early stages of phthisis, in whom the sound lung-tissue remaining is sufficient to perform its function under the stimulating effect of the cold, dry air. Patients suffering from chronic bronchial catarrh, nervous asthma, and general

debility are said to do well at Davos. Turban's open-air treatment is interesting to observe. The main features of his sanatorium are rest, feeding, and fresh air. Turban takes cases in any stage of consumption, and claims that 40 per cent. leave apparently cured. Davos is constantly growing in popularity and size. This, however, may be a disadvantage, as statistics clearly prove that tuberculosis is less frequent, in proportion to the population, in sparsely-settled regions than in crowded towns; and this crowding of a number of patients may have a deleterious effect.

Pfoeffler's is one of the oldest watering-places in Switzerland. The hotel at the spring was built in 1704. Graham praises the purity of water in Geneva, and says it is one of the healthiest cities in the world. The *bise*, so much dreaded by phthysical patients, is really of great benefit in carrying away atmospheric impurities. For the last three years, Montreux, situated on the north shore of Lake Geneva, and for so long a favorite resort of the invalid, has not been so much frequented as formerly, on account of the mist and fog that has prevailed there of late. Aigle is reached in less than an hour's time from Montreux. Above Aigle is a consumptive's cure, Leysin, which is every year becoming more noted. Graham also speaks highly of Les Avants, referred to in the ANNUAL of last year. It is situated on a plateau over 3000 feet above the sea. The Hotel Les Avants is filled in summer with patients and tourists, but it is as a winter resort that it has become famous. The advantages are pureness and dryness of air, absence of high winds, and abundance of sunshine. Sun-boxes, about twice the size of sentry-boxes, are an institution of Les Avants. In these, patients, while sheltered from the wind, may remain in the sunshine for several hours each day.

In an article by Thomas Linn, of Nice, ⁶_{Aug. 27} he recommends Nice for the following troubles: chronic bronchitis, phthisis of the "passive" kind, chronic inflammation of the larynx, nares, etc.; general debility, accompanied by dyspepsia, anæmia, or hypochondriasis; diabetes, dysmenorrhœa, paralysis, rheumatism, sciatica, and gout. He does not advise this climate for various nervous affections. He does not agree that there is any choice of climate between the different resorts of the Riviera. Other authorities maintain that Nice is more windy than Hyères, Mentone, or San Remo, and that its gay and brilliant life would have a most

injurious effect on some patients. While this last factor may be true in some cases, it has the advantage over most health resorts of avoiding one of their chief drawbacks, viz., *ennui*. The same author, in collaboration with S. M. Rendall, of Mentone, ⁴⁸³_{Nov., '21} writes further of the Riviera. In addition to the class of patients who usually derive benefit there, the aged, prematurely aged, and the overworked are mentioned. Besides the fact that warmth is life to all enfeebled persons, there is a certain exciting element in the air of the Riviera which stimulates all the organs to a better performance of their functions. Women suffering from painful menstruation and painful affections of the uterus derive benefit in this climate. All women's complaints, unless there is a tendency to flooding, improve. But the exciting element in the atmosphere before mentioned will produce insomnia in certain nervous patients.

Charles E. Cormack, of Hyères, ⁴⁸³_{Jan.} recommends that place as being the warmest and most equable of all the stations of the French Riviera. The winter there is exceptionally mild. The writer has contributed some valuable tables, showing the monthly average of the thermometer and barometer, also the humidity and average rain-fall of Hyères. He speaks of the *mistral*, or north-west wind, as an unpleasant feature of the winter months. It is very trying to invalids and nervous patients, and such do well to remain in-doors while it lasts. It is not peculiar to Hyères, however, as it is felt at all points along the Riviera. Although so unpleasant, the *mistral* is said to be a blessing in disguise in driving away all malaria.

In this connection, it will be interesting to note the meteorological observations on the climate of the Riviera, made by C. T. Williams, of London, ²_{Mar. 19}. He finds the climate of the Riviera to be coldest in December, when the mean minimum temperature is from 42° to 46° F. (5.55° to 7.77° C.). Frost and snow are seen at times, but do not continue for long. The relative humidity varies from 68 to 74 per cent. November is the wettest month. The lowest average rain-fall is at Hyères, the highest at Genoa. The winds are a great feature of the climate: The *mistral*, or northwest wind, which is of great violence in March, especially at Avignon, is greatly dreaded by invalids. The *bise* (northeast) is also feared; it is a cold blast from the Maritime Alps. The *sirocco* (south and

southeast), when it comes in winter, is chiefly objectionable because it is a rain-bringer. The winter climate of the district, then, is clear, bright, dry, with a good deal of wind; with fog and mist practically unknown; with a temperature of 8° to 10° F. (4.44° to 5.55° C.) higher than that of England, but subject to considerable nocturnal variation. There are half the number of rainy days, and four or five times the number of bright ones, found in England; and those who complain of the cold winds of the Riviera should be reminded that these, too, have their beneficial uses, and exercise an aseptic and bracing influence on what might otherwise be too protected and calm an atmosphere.

A series of letters ⁵⁹_{Apr. 2, 30; May 28} treat of Cannes, St. Rapheal, Frejus, Grasse, Beaulieu, and the new resorts of Juan-les-Pins and Antibes. The observations on climate, particularly the winds of the Riviera, and the botanical, hygienic, and social notes are attractive. Frankland proposes a plan by which some of the benefits of these resorts may be attained in English winter watering-places. "To the north of the grounds attached to the dwelling," he says, "let a wall twenty or thirty feet high be built, stretching round eastward and westward, and let it be whitewashed on its southern side to reflect the sun's rays. With the reflection from the sea and the artificial reflection, there would be created, whenever the sun shone in winter, a climate of the same character as that of Davos, in the Engadine,—that is to say, powerful sun-warmth, with a cold and bracing air."

The climate of Heligoland ²²_{Aug. 31} is said to be peculiarly favorable for late sea-bathing, as it is mild and equable, and autumn is really the warmest period of the year.

In answer to the statement made that Maloja is in an unsatisfactory sanitary condition, M. G. Forster, of Maloja, ²_{Aug. 21} asserts that during the past two summers there has been no case of enteric fever, diphtheria, or contagious fever, except one case of rubeola. Three cases of ulcerated sore throat occurred in the summer of 1891, but they could not be traced in the remotest way to any sanitary defect. Of one hundred and ten house-servants, naturally passing most of their time in-doors, no case of sore throat was discovered.

Sherwood, of Eastbourne, ⁶_{Sept. 17} describes a system of voluntary registration of sanitary houses in that watering-place which has

been established by the corporation of Eastbourne, and which might advantageously be pursued at all health resorts. When certain sanitary requirements as to drains, traps, water-closets, dust-bins, and drinking-water are fulfilled, a certificate is given by the inspectors. These certificates are largely in demand by lodging-house keepers and landlords; and this thorough sanitary inspection of houses is establishing the reputation of Eastbourne among visitors as a safe health resort.

BALNEOLOGY.

In a most excellent series of papers on the mineral springs of the United States, A. N. Bell, of New York, ⁹⁰⁶_{May, July, Sept.} divides all mineral waters into eight classes, viz.: 1. *Acidulous waters*, whose virtues are due chiefly to the presence of free carbonic-acid gas. Different waters of this class also possess the properties of some one or more of the other groups, into which they may also be classified with equal propriety. 2. *Alkaline waters*, commonly distinguished by containing carbonate of soda and free carbonic-acid gas, with or without the presence of the chloride and sulphate of soda. Hence, they may be alkaline-sodic or acidulous-alkaline, containing bicarbonate of soda; alkaline-muriatic, containing the chloride of soda; or alkaline-saline, containing the sulphate of soda,—all variable. In the purest alkaline waters there are scarcely any solid ingredients except the carbonates of the alkalies. 3. *Calcareous or earthy waters*, characterized by the presence of the sulphates and carbonates of lime and other alkaline earths, frequently held in solution by an excess of carbonic acid. Sulphate of lime is the particular salt upon which the properties of these waters commonly depend. They are generally designated by the name of “hard waters.” 4. *Chalybeate waters*, containing iron in the form of the bicarbonate of the protoxide, held in solution by an excess of carbonic acid, with rare exceptions. These waters are, for the most part, cold, although they are sometimes thermal; and are frequently strongly acidulous from a large excess of free carbonic acid. 5. *Chemically-indifferent waters*, comprising waters which do not contain a sufficient amount of any chemical substance to give a distinctive character; yet they seem to possess properties which give them some medicinal value. 6. *Saline waters*, commonly distinguished by the presence of a large amount of the

chloride of soda. 7. *Sulphuretted waters*, distinguished by the presence of the sulphide of hydrogen. These waters are widely distributed, and are cold or thermal in various degrees. 8. *Uncharacterized waters*, comprising all waters whose properties are not sufficiently well known by chemical analysis or otherwise to signify their properties.

He then divides the entire country into four sections, and gives, as far as possible, an analysis of the different waters, together with a short description of their surroundings. It will suffice to show how little attention has been paid to balneology in this country when one learns that of one hundred and eighty-one springs in Georgia, for example, only seven have published analyses; and it is still more surprising to know that many of the Georgian springs have been held in high esteem for many years. In South Carolina thirty-one springs are listed, and an analysis of only six can be found. These springs are all situated in a delightful, healthy region, at an altitude of from four hundred to one thousand feet, and, before many years, they will undoubtedly be largely visited. A particularly attractive account is given of the springs of North Carolina, numbering eighty-two, with twenty analyses. The warm and hot springs of Buncombe County, situated in the northwestern part of the State, in a beautiful and romantic region, embosomed in lofty mountains, are the best known. There are several springs, varying in temperature from 94° to 104° F. (34.4° to 40° C.), and containing the chlorides of calcium and magnesium, and the sulphates of the same minerals. These waters are used both externally and internally, and are found efficacious in chronic rheumatism, gout, and hepatic engorgements. Unfortunately, the series is not yet complete; but it promises to be a most valuable contribution to American balneology.

W. F. Waugh, of Philadelphia, ⁷⁶⁰_{AUG. 27} speaks in the highest terms of Bedford Mineral Springs. According to him, no American mineral water compares in value or reputation with the Bedford Magnesia Spring, while in Europe its only rival is the Carlsbad Spring. Its capacity is one barrel a minute; of crystal purity, free from organic matter, and containing only $\frac{1}{4}$ grain (0.016 gramme) of iron to the gallon. It is a gentle laxative, yet it can be used in many cases of anæmia and debility where the ordinary salines cannot. It is also safe and efficient for gouty and plethoric per-

sons, who cannot take a chalybeate water without danger of apoplexy. Its principal indications are in diseases of the liver, kidneys, and digestive tract; in syphilis, scrofula, rheumatism, and gout; in catarrhal affections generally; in anæmia, and in all nervous affections. The springs are visited also by a large number of persons, who go there every year to drink the water as a prophylactic.

Several reports have been presented to the French Academy of Sciences ¹⁵³_{Aug.18} on the best methods of preserving natural mineral waters. Parmentier considers that the carbonic acid of the laboratory is never as good as that in a natural bicarbonated water; and he advises that the bottles should first be filled with natural carbonic acid before the water is put in. Contrary to the general belief, light does not injure these waters. Riban reported on the changes in bottled ferruginous waters. He analyzed bottled water from nine different springs, and found that they contained from 50 to 100 per cent. less iron than the same waters at the springs,—a condition of affairs which well explains the poor results so often obtained from these waters at a distance from their source.

Alfonso Montefusco, of Naples, ¹⁵³_{Aug.18} has made a number of examinations of different bottled natural waters, and has found micro-organisms in many of them. The natural and artificial carbonated waters contain few or none, and this he is inclined to attribute to the amount of carbonic acid which they contain.

J. M. Cyonos, of Paris, ¹⁵³_{Aug.11} would restrict the term “table waters” to natural bicarbonated and chalybeate mineral waters; and, of these two classes, only those should be so used which contain from 20 to 30 grains (1.30 to 1.94 grammes) of alkaline salts, or about $\frac{1}{10}$ grain (0.0065 gramme) of iron to the quart (litre).

Axel Winckler, of Würzburg, ⁸⁷⁰_{Nos.12,13,14,15} disputes the claim which France has made of having more baths than any other country, and maintains that very many of its legion of mineral waters are simply hard drinking-waters, and should no longer be classed among active mineral springs. Of the chalybeate waters, the following only contain more than 0.02 gramme ($\frac{1}{3}$ grain) of iron to the litre (quart): Andabre, 0.065 gramme (1 grain); Barbotan, 0.031 gramme ($\frac{7}{19}$ grain); Bussang, 0.017 gramme ($\frac{9}{34}$ grain); Chabetout, 0.047 gramme ($\frac{3}{4}$ grain); Château-Neuf, 0.034 gramme ($\frac{6}{11}$ grain); Châteldon, 0.035 gramme ($\frac{6}{11}$ grain); Charbonnières,

0.04 gramme ($\frac{3}{5}$ grain); Sail-les-Bains, 0.06 gramme ($\frac{9}{10}$ grain); Sail-sous-Couzan, 0.008 gramme ($\frac{1}{8}$ grain); St. Alban, 0.023 gramme ($\frac{1}{3}$ grain); and St. Pardoux, 0.02 gramme ($\frac{2}{7}$ grain). In Germany, on the other hand, the following springs—Alexandersbad, 0.058 gramme ($\frac{9}{11}$ grain); Bocklet, 0.088 gramme ($1\frac{4}{5}$ grains); Driburg, 0.074 gramme ($1\frac{1}{6}$ grains); Elster, 0.086 gramme ($1\frac{1}{3}$ grains); Griesbach, 0.078 gramme ($1\frac{2}{3}$ grains); Liebenstein, 0.081 grammè ($1\frac{1}{4}$ grains); Pyrmont, 0.077 gramme ($1\frac{1}{5}$ grains); Schwalbach, 0.06 gramme ($\frac{9}{10}$ grain); Steben, 0.062 gramme ($1\frac{5}{16}$ grain); and Sylt, 0.127 gramme ($1\frac{8}{9}$ grains)—are surpassed only by Orezza, in Corsica, and La Bauche, in Savoy, the former having 0.129 gramme ($1\frac{1}{2}$ grains), and the latter 0.142 gramme ($2\frac{1}{5}$ grains) of iron to the litre (quart). Externally, these waters are of no value, on account of the small quantity of carbonic acid which they contain. The so-called “Eaux ferrugineuses crenatées” he considers a humbug, and claims that they are simply chalybeate waters which contain more or less earthy substances. The saline waters are really superior to those of Germany, but not so numerous; and, on this account, it is not the custom, as it is in Germany, to concentrate them artificially. The principal spring of this class is Salies-de-Béarn, which contains 216 grammes (7 ounces) of common salt to the litre (quart). The other notable saline springs are Balaruc, 7 grammes ($1\frac{5}{8}$ drachms); Bourbonne, 6 grammes ($1\frac{1}{2}$ drachms); Hammam Mèlouane, 26 grammes ($6\frac{1}{2}$ drachms); Salins, in the Jura, 27 grammes (7 drachms); and Salins, in Savoy, 10 grammes ($2\frac{1}{2}$ drachms) to the litre (quart). All the springs of this class are cold, and contain very little carbonic acid, which renders them more suitable for drinking. There are no warm saline springs in France.

Vichy and Vals stand at the head of the French alkaline waters, and are far superior to anything of the kind in Germany, although at Wiesbaden a water is sold which is said to contain twice as much bicarbonate of soda as the Vichy. In Wiesbaden, however, enough bicarbonate of soda is added to the natural water to make it of the desired strength, thus producing an artificial water. The water at Vals contains 6.20 grammes ($1\frac{3}{5}$ drachms) of bicarbonate of soda to the litre, which is nearly twice as much as is found in Fachingen, the richest alkaline spring in Germany. Of the German springs, the Kaiser Friedrich Spring, at Offenbach,

comes next with 2.40 grammes (37 grains); Ems, 2 grammes (31 grains); and Apollinaris, Neumahr, Selters, and the Kronenquelle, at Salzbrunn, with about 0.80 gramme ($12\frac{1}{3}$ grains) of bicarbonate of soda to the litre. The water at Vals is cold, while that at Vichy is, for the most part, hot. Vichy is undoubtedly the best-known spring in France, and well deserves the name of "the queen of waters." The springs here are of two kinds, natural and artesian. The former are, with one exception, hot: Puits-Carré and Puits-Chomel, 43.6° C. (110.5° F.); Grande-Grille, 42.5° C. (108.5° F.); Celestins, 14.3° C. (58° F.). The artesian waters are all cold. One volume of Vichy water contains one-half volume of free carbonic-acid gas; and, on account of the great demand for the water, it is mixed with an equal volume of ordinary water for bathing purposes, so that the action of the gas is much lessened. During the season, three hundred and sixty bath-rooms are in constant use, besides the douche-rooms, so that an enormous quantity of water is used daily. There are twenty-three other alkaline springs, but the majority of them are quite weak. They are mostly of volcanic origin, and situated in Auvergne. The hottest, at Claude-Aigues, have a temperature of 51° to 81.6° C. (123.8° to 178.9° F.), but contain less than 1 gramme ($15\frac{1}{2}$ grains) of alkali to the litre. The sulphur springs number more than one hundred, and large numbers are found in the Pyrénées. The best known is Aix-les-Bains, where there are two springs of a temperature of 43° to 45° C. (109.4° to 113° F.), containing free sulphuretted hydrogen, carbonic acid, sulphate of sodium, sulphate of calcium, and small amounts of iron and iodine. These waters are mostly used externally, and all the latest and most scientific methods and appliances are employed. Other springs of this class are Allevard, Amélie-les-Bains, Aix, Bagnols, Baréges, Eaux-Bonnes, Brides, and Cambo. Caunterets deserves especial mention, on account of having one spring which contains 0.03 gramme ($\frac{1}{2}$ grain) of sulphite of soda to the litre.

Besides the warm sulphur springs, there are a few cold ones, of which the most important are Bagnères-de-Bigorre, La Caille, Echaillon, Eughien, Euzet, Gamarde, Pierrefonds, and St. Loubouer.

All of the thermal springs are really indifferent, although they are grouped by the French under different classes. To this

class belong Bains, Dax, Foncaude, Luxeuil, Mont-Dore, Nérís, Plombières, and Hammam-Meskoutine. The latter is undoubtedly the largest of its kind in the world; but, on account of its location in Algiers, it is not as yet well known. Within a space of about one square mile an immense number of springs, wells, and pools are found, all of a uniform temperature, 75° C. (167° F.), and inexhaustible. From one spring alone it is estimated that more than 1,500,000 litres (quarts) daily are discharged. This water contains very few solids except chloride of sodium and the carbonate and sulphate of lime. The government has established here a military as well as a civil hospital, to which are sent those suffering from paralysis, hemiplegia, paraplegia, neuralgia, chronic skin diseases, syphilis, or malaria.

Venezuela has joined the list of countries having thermal springs, and we now have descriptions ⁷⁵⁵_{Oct., '91} of three: Onoto, Mariara, and Las Trincheras. Onoto is near the city of Maracay, at an elevation of about two thousand feet; it is perfectly clear, and has a temperature of 44.5° C. (112° F.). Mariara lies at an elevation of fifteen hundred feet, with a temperature of 36° to 60° C. (97° to 140° F.), and on cooling gives off an odor of sulphur. Las Trincheras is the only one of the three which has been analyzed, and it is found to contain sulphates and chlorides of sodium, calcium, magnesium, and lithium, with small amounts of oxide of iron.

Siberia is not a country where one would expect to find health resorts. Still, it is the determination of the Russians ⁶_{Mar. 6} to have baths of their own. The waters of Lake Ingol, in the Yeniseiski government, about two hundred miles east of Tomsk, have been examined by Zaleski, of Tomsk, who reports that, although the water is chemically indifferent, still it, as well as the mud, is suited to the treatment of many classes of chronic affections. The Russian government seems anxious to develop the hydro-therapeutic resources of Siberia, and Zaleski has received instructions to report on Lake Shiro.

Frederick Peterson, of New York, ¹_{June 25} describes the baths at Helwán, in Egypt, believed to be the oldest health resort in the world. There are about a dozen springs, having a temperature of 77° to 86° F. (25° to 30° C.),—sulphurous, chalybeate, and saline. The bath-houses are commodious and luxurious. The temperature

of the air in winter during the day is 70° to 75° F. (21.1° to 23.9° C.) in the shade. The pyramids and mounds of ancient Memphis are in plain view across the desert, while Cairo, fifteen miles to the north, affords inexhaustible resources to the pleasure seeker.

E. Weiss²³²_{Aug. 5} publishes a description of the thermal springs of Yalova, in Asia Minor, also called Dagli-Hamam or Corou. These springs are three in number, and the supply of water is inexhaustible. It is limpid, colorless, of agreeable taste, and has a temperature of about 64.5° C. (148° F.). Chemical analysis shows the presence of small quantities of carbonic and sulphuric acid, in combination with iron, calcium, magnesium, potassium, sodium, and aluminum.

E. Torres⁷⁹²_{Jan.} gives a short but comprehensive account of the springs of Santa Rosalia. They are classed among the sulphuretted waters, and contain sulphuretted hydrogen, chloride of sodium, sulphate of calcium, sulphurous and phosphoric acids. Their use is advised especially in scrofulous conditions, affections of the kidneys, and phthisis.

The baths of San Miguel, in Cuba,⁴⁵⁹_{No. 16} are ferruginous, and are used in chronic diseases, skin affections, rheumatism, and especially in paralyses. The season lasts from the beginning of May to the middle of June.

Emile Bertherand¹⁴²_{Dec. 30, '91; Feb. 29} describes the springs of Ben Haroun, in Algiers, which he discovered in 1850. At present they are twelve in number: five chalybeate, and seven carbonated. The former are colorless, cool, of agreeable taste, and odorless; any sulphurous odor being due to poor bottling. The carbonated waters are used as table-waters.

A. Bouyer, of Bordeaux,¹⁸⁸_{May 8, '22} gives an extended account of the sulphur springs of Canterets. This water has a very soothing effect on the entire system, quieting nervous excitement, as well as re-establishing all disordered functions. Ludwig⁸_{Sept. 29} describes the water sold under the name of "the Original Selters," which comes from Weilburg, in Nassau. The capacity of the spring is about 300 gallons (1200 litres) of water an hour, through which is bubbling continually large quantities of carbonic-acid gas. The water is colorless, clear as crystal, of pleasant taste, and has a temperature of 10.2° C. (50° F.) Its principal constituents are carbonate

of calcium, chloride of sodium, chloride of magnesium, binoxide of manganese, free carbonic acid, a little iron, and hardly any organic substances.

Eklund, of Stockholm, corresponding editor,^{996 Aug. 25} explains the method of procedure at the baths of Wanberg, in Sweden. After being enveloped in a pack, the patient goes into the massage-room, where he is massaged for fifteen or twenty minutes by three attendants. Next he is rubbed with mud, which is followed by a douche of water at 35° C. (95° F.). After the mud has been removed in this way, a full bath at 37° C. (98.6° F.) is taken, of six minutes' duration, during which time continuous friction is kept up by the attendants. After the bath comes friction again, with soap and a brush, followed by a gentle douche to remove the soap. He is then carefully dried off, and again enveloped in a pack, where he remains three-quarters of an hour, when friction is again employed. The treatment is then completed by a plunge-bath at a temperature of 23° C. (73.4° F.).

A short article by St. Clair Thomson, of London,^{2 Aug. 20} is devoted to St. Moritz. The springs here are three in number, all cold, containing the carbonate of iron, and charged with carbonic acid. The old spring is used exclusively for baths; the Paracelsus is the one generally used for drinking; while the Surpunt, the third, has only been opened this season. In the bath the patient lies down at full length in a tub, with the water at a temperature of 90° F. (32.2° C.),—in successive baths this is reduced to 78° F. (25.6° C.),—and is covered with boards having an opening for the head. Thus boxed up, he remains quiet for twenty minutes, in order that the bubbles of gas may develop on the surface of the body. These waters are indicated whenever a strong tonic is desired, and are suited for the treatment of anæmia, neurasthenia, or protracted convalescence from acute diseases.

Chauvet, of Royat,^{755 Nov. 79} gives an account of a series of thirty-five cases of diabetes treated at the springs of Royat, all of which were benefited and some cured. The patients' general condition improved, their strength increased, the alarming symptoms subsided, and the quantity of sugar passed was diminished, on an average, 65 per cent. The principal ingredients of these waters are carbonates of sodium, potassium, calcium, and magnesium, chloride of lithium (0.035 per cent.), chloride of sodium, and

arsenite of soda and iron. The temperature of the water varies from 20° C. to 35.5° C. (68° F. to 96° F.), and from 1 to 6 glasses are taken at a time. The water is also used externally.

A. W. Gilchrist⁴⁸³_{Feb.} states that the richest warm arsenical waters known are the springs of Choussy-Perrière, containing arsenic in what may be considered convenient medicinal doses. The remaining mineral constituents, which include from 40 to 50 grains (2.67 to 3.33 grammes) per gallon each of alkaline chlorides and bicarbonates, closely approach in quantity and proportion the normal mineral components of blood-serum. The arsenic in this association and degree of solution assumes a greatly enhanced value as a therapeutic agent, being more easily tolerated, more readily absorbed, and eliminated with greater rapidity. Besides their internal administration, the waters are also much utilized for baths, sprays, and douches. As regards the therapeutic indications of the waters, the author mentions particularly lymphatism, struma, and scrofula, cases of which invariably derive great benefit from their use. Glandular enlargement, nasal catarrh, and ozaena; enlarged tonsils, otitis, and blepharitis; joint- and bone-affections occurring in children are cured or greatly improved. In chronic diseases of the skin (eczema, psoriasis, urticaria, acne, lupus) the waters are highly efficient, while syphilis associated with malaria and syphilis in strumous persons are frequently benefited. In anæmia, chlorosis, malaria, diabetes, and affections of the throat and respiratory passages, the Choussy-Perrière waters exert a very favorable action.

Albert Robin, of Paris,¹⁰_{Apr. 12} gives some extracts from reports made to the Academy of Medicine by the permanent commission on French mineral waters. The springs at St. Nectaire increase the total amount of urea excreted, but are contra-indicated in certain forms of rheumatic arthritis. The spring of Maizières (Côté d'Or) contains lithium and sodium, as well as carbonic acid. It has been used with good results in dyspepsia and lithiasis. It is aperient, laxative, and diuretic. The waters of Baréges also increase the amount of urea and uric acid excreted, and diminish the amount of alkaline and earthy phosphates.

A short article⁷⁰_{July 17} calls attention to the custom of the French authorities of sending poor children suffering from rickets, enlarged glands, or scrofula to the thermal springs of Dax for treat-

ment. At present sixteen are there, and all are being benefited by the course.

C. C. Ransom, of New York, ²⁰⁶⁵ lays stress on the fact that the effect of treatment at any one spring is not due to the waters alone, but to the environment of the patient. The practical value of any treatment depends upon its correct application; and, in sending our patients to any given spring, we must not only know the effect of the water, but also whether or not the treatment will be properly given.

HYDROTHERAPY.

The use of water as a therapeutic agent is unquestionably more general to-day than ever before. The history, physiology, and technique of hydrotherapy have been discussed in a lengthy article, ²⁰⁶¹ and in an original monograph. ²⁰⁶²

Wilkins, of Montreal, ⁹⁰⁶_{Aug.} reported thirty-nine cases of typhoid fever, with a mortality of two. Although he at first adopted the Liebermeister method (cold baths and quinine), he now adheres to the Brand method, with slight modifications. He seldom kept his patients longer than ten minutes in the bath, the temperature of which ranged from 68° to 70° F. (20° to 21.1° C.), and treated mild cases on the expectant plan.

Osler's results in the Johns Hopkins Hospital were brought out in the discussion of Wilkins's paper before the Association of American Physicians. Thirty-two cases treated symptomatically gave 7 deaths, while 107 cases treated rigidly (?) by Brand's method gave 8 deaths. [While I regard these results as favorable, I believe that they would have been more favorable if the Brand baths had been *rigidly* administered. This they were not, since the temperature was not lower than 70° F. (21.1° C.).—Ed.] Pepper, of Philadelphia, testified to his progressive conversion to belief in the treatment and the desirability of its use in the vast majority of cases of typhoid as a routine treatment. W. G. Thompson, of New York, expressed his just surprise that the author of the paper did not dwell upon frictions, and justly remarked that the reduction of temperature must not be regarded as the principal object.

One prime condition of success is, that bathing should be begun before the fifth day, thus confining the pathological changes in Peyer's glands to the stage of infiltration. Vogl's statistics of the number of diarrhœa and tympanitic cases show the compara-

tive rarity of these premonitory symptoms of perforation in cases bathed early and rigidly. Only by strict adherence to Brand's technique—to bathe with friction every three hours, night and day, at 65° F. (18.3° C.) when patient's temperature reaches 102° F. (38.9° C.)—may we attain the most favorable results. As the omission of some details in antiseptic surgery is fatal to its success, the omission of any detail of the Brand method is likewise detrimental, and a modification in the technique must produce a modification in results,—in the one as well as in the other.

The awakening of the French profession to the value of Brand's method is evidenced by the "Cold Baths in Typhoid Fever" being made the subject for the 5000-franc Prix Louis for 1892. When the seemingly heroic cold-bath method is inapplicable, on account of the patient's condition or the prejudice of patient or friends, a valuable substitute has been recommended by James Barr, of Liverpool,²⁰⁶³ who calls it the "tank treatment." The tank consists of a wooden box, six feet long, two feet ten inches wide, and sixteen inches deep, lined with lead, painted white, and covered with shellac varnish, and supplied with discharge-pipe. Each tank is provided with a sheet of bed-ticking, upon which the patient may lie submerged, the head resting upon a strip a foot wide, to keep it above water. The patient is wrapped in a blanket, so as to prevent chilling in case of the chest rising above the water. The tank is covered by a half-lid and a water-proof sheet. By removing a bucketful of tank-water and adding the same quantity of hot water every two hours the water may be maintained at 90° to 93° F. (32.2° to 33.9° C.). This is continued as long as the body-temperature is over 100° F. (37.8° C.); when it is lower, the water should be warmer. By this submersion Barr claims that thermogenesis is diminished, thermolysis regulated, and the thermotaxic mechanism is improved. The evening exacerbation is lessened in intensity and duration, the remissions increased, and the mean daily temperature lowered; there is a marked improvement in the vasomotor tone; the pulse becomes slower and full; the heart stronger; liability to hæmorrhage is diminished; respiration is slowed; bronchitis and congestion of lungs disappear. Improvement in digestion and appetite is marked; tongue remains moist; diarrhœa is lessened; delirium disappears, and the general condition improves. Barr had treated 22 cases

by this method, 11 cases by wet pack, etc., and 22 cases symptomatically. Among these 55 cases there was 1 death. While these statistics do not actually sustain the advantages of the tank treatment over other treatments, it is undoubtedly valuable as a substitute.

Riess, of Berlin, ²⁰⁶⁴_{v.2, pp.149,154} reports 809 cases thus treated, with 26 deaths, the duration of the disease in the favorable cases being decidedly shortened. Gogruve ⁶⁹_{No.5} reports 62 cases of typhoid treated in the Greifswald clinic, with a mortality of 3.2 per cent., which favorable result he ascribes to the treatment by gradually cooled baths, careful diet, and frequent change of position. Baths were given from 90° F. (32.2° C.), reduced to 71° F. (21.66° C.), a douche being added when the brain was affected. Wine was given abundantly during the bath. Patients bore the graduated bath better than cold baths; temperature and pulse, lung and brain symptoms were favorably influenced. Cold packs were given at night and during the stage of defervescence; also, cold water abundantly by the mouth and at times by the rectum. Taking the patients into the open air acted favorably.

Roque and Weill ⁹²_{No.9,'91} affirm that the bath treatment favors the elimination of toxic products, whilst antipyretics diminish it. Teissier reached the same conclusions.

In the eruptive fevers Guinon ¹¹⁸_{Nov., '91} says that there are three great indications: to moderate the fever, quiet nervous disturbances, and prevent or combat the secondary infections. The antipyretics should be avoided. Hydrotherapy certainly provides more efficient means, and is easier of control. The warm bath (86° to 95° F.—30° to 35° C.) for fifteen minutes is particularly useful in the early stage of scarlatina and variola, followed by rubbing dry with a warm sheet. The tepid bath (77° to 86° F.—25° to 30° C.) prepares for the cold bath. Cold affusion is indicated when temperature is high (102° to 106° F.—38.9° to 41.1° C.), with dry skin, adynamia, delirium, and threatening convulsions,—conditions sometimes observed before rash develops. The patient being seated in an empty tub, three to four pails of water (68° to 77° F.—20° to 25° C.), each being lowered, are successively thrown upon him for about one minute; then he is wrapped in a sheet and blanket without being dried. The temperature is not lowered, but the pulse and cerebral symptoms are

improved. The affusion must be applied four or five times daily. The cold pack (54° to 57° F.— 12.2° to 13.9° C.) is certainly quieting and cooling, but it is tiresome and unpleasant to the patient. Cold washing, passing a sponge with water at 64° to 77° F. (17.8° to 25° C.) repeatedly over the body is quieting, and reduces the pulse, but the effect is very brief. Cold baths are the selective method of Guinon in persistent pyrexia and adynamia of scarlatina, when there is no cyanosis or feeble pulse. Pulmonary complications are favorably influenced by it. Fifteen minutes in water, at 75° to 80° F. (23.9° to 26.7° C.), suffice, if repeated every three hours until the temperature approaches normal. The graduated bath is not so useful; shivering is more frequent. In malignant measles, with hyperpyrexia, delirium, and cyanosis, hydrotherapy is the only active means. In adynamia, cold affusion is best; in convulsions, a tepid bath, with cold affusion to the head, and at the same time small and repeated doses of chloral by the mouth and enemata. Pulmonary congestions and bronchopneumonia, with high temperature, are favorably affected by baths. In variola Guinon finds cold baths eminently useful to overcome the nervous accidents and moderate suppuration. Tepid baths decrease pain, and warm baths are cleansing. In the invasion stage, with dyspnoea, somnolence, and temperature of 104° F. (40° C.), cold baths (64° to 68° F.— 17.8° to 20° C.—for adults, 70° to 74° F.— 21.1° to 23.3° C.—for children) should be used systematically, and in sudden danger cold affusion. These cold baths do not check, but favor, eruption and diuresis.

Baginsky¹⁵⁸_{B.13, '91} reports 30 cases of croupous pneumonia in children treated by hydiatic measures, a majority with high temperature,—up to 41° C. (105.8° F.). The results were 24 cured, 2 convalescent, and the others improving. Powerful antipyretics are, according to Baginsky, injurious to the heart-muscles and blood-corpuscles. Cold water is least likely to do harm and most suitable for children, though very cold baths must be avoided. Baths of 76° to 86° F. (24.4° to 30° C.) and the cold pack are most useful, especially the latter, as a vivifying tonic. The child is wrapped entirely, except the face, in a sheet wrung out of water at 58° to 72° F. (14.4° to 22.2° C.), and covered with a woollen blanket. In ten minutes this is repeated, and again in ten minutes. In the last pack it remains a half-hour; then is dried and

tightly covered. This may be done two or three times a day. Wine is given, but only where high temperature is accompanied by marked nervous disturbance. In protracted febrile conditions, like typhoid fever, he combines medicinal antipyretics with the bath.

Hutinel¹⁴ emphasizes the important fact that cold baths are most useful in those cases of broncho-pneumonia in which the general symptoms are marked and nervous symptoms predominate. The heat is diminished, various secretions are enhanced, the arterial pressure is increased, and the heart is sustained. Chemical antithermics produce untoward effects, but may be used moderately in conjunction with the bath. The cold bath gives a lashing to the nervous system as in typhoid fever; it diminishes depression and prevents convulsions, producing calm slumber in the stage of excitement. When families oppose the cold bath, a little artifice may be employed, such as adding a little mustard to the water under the guise of a revulsive. The bath is contra-indicated when the local lesion is extensive, but useful even then, if temperature is high. It is contra-indicated also when the heart is disturbed or the adynamia marked. Even in the youngest children it may produce marvelous results, because the general symptoms usually predominate in them. Hutinel puts the child into a tub containing water at 92° F. (33.3° C.), for a period ranging from five to ten minutes, taking it out before it becomes chilled. The temperature of the water is lowered with each bath until it reaches 75° F. (23.9° C.). Friction should be practiced and the head soused with cold water. Patient is put in woolen sheets, dried, and fed. If in three hours the temperature is still above 102° F. (38.9° C.), the bath must be repeated until dyspnoea and excitement have abated. Quinine is given to sustain the heart; also a hypodermatic of caffeine and ether in collapse. Milk and water and broth are insisted upon, to increase urine; also grog and cognac, of which a child 1 year old may take as high as 2 ounces (60 grammes) a day. The cold bath is of service in the broncho-pneumonia of measles and whooping-cough.

Angel Money⁶ recommends warmly the ice treatment in all kinds of broncho-pneumonia in children of all ages. The smaller the child, the more pronounced the effect. In these Money puts ice-bags on the head; in severe cases he puts them on the chest also,

or he uses a Leiter coil. This treatment sustains the vital powers, the heart, respiratory centres, nervous and muscular system; shortens the disease, induces sleep, reduces the temperature markedly. Stimulants may be used in combination. A high rectal temperature is the guide.

Fiedler¹¹⁶_{No. 12} states that, in the treatment of cholera nostras by the introduction of large quantities of water, the chief danger lies in the rapid loss of water from the system. Large quantities of water, administered by the mouth, sometimes produce a rapid, favorable change in the diarrhœa, while vomiting may still continue for awhile, the muscular cramp being last to yield. This treatment shortens the duration of the disease materially.

In the pædiatric section of the New York Academy of Medicine, the discussion of summer diarrhœa of infants, by specialists appointed for this purpose, included an argument by Simon Baruch, of New York, on "Conditions Indicating Baths and Change of Air." Bathing for cleanliness is always demanded as a prophylactic. For therapeutic purposes he advises, when the temperature reaches 102° F. (38.9° C.), a full bath at 90° F. (32.2° C.), gradually reduced to 80° F. (26.7° C.), for fifteen minutes, with active friction, followed by drying in a linen sheet. This not only reduces temperature, but counteracts the vasomotor paralysis evinced by pallor of skin, etc. In subacute diarrhœa Baruch advises cold ablutions as a tonic, given with the hand. Baruch cites the case of an infant, 6 months old, rescued from impending death, with temperature of 106° F. (41.1° C.), vomiting, etc., by a bath of 90° F. (32.2° C.), reduced to 80° F. (26.7° C.), and wet compresses.

Intestinal irrigation was highly praised in the discussion by Jacobi and Baruch. It has become the standard method of treatment in summer diarrhœa.

Guido Rheiner¹¹⁶_{No. 1, '91} advises the retention of the last part of the water. Baruch,¹⁹¹_{Jan., May} in a paper read before the New York State Medical Society, concludes that hydrotherapy is an important and much neglected auxiliary in the treatment of chronic diseases, and that in many cases it has proved so successful, after failure of medicinal agents, that no case should be yielded up as hopeless until hydrotherapy in some form has been tried. The most important elements are the thorough mastering of the general principles, precision in their application, and their perfect adapta-

tion to the constitutional peculiarities of each case, *i.e.*, not treating the disease, but the patient. For this reason, men like Leyden, Charcot, Binswanger, Semmola, Ziemssen, Erb, Nothnagel, and others send their patients to hydro-therapeutic establishments with diagnosis and general suggestions rather than with specific directions.

Baruch details cases of phthisis, chronic rheumatism, and functional nervous diseases treated at the Montefiore Home by means of baths. One case of phthisis (with a cavity) gained twenty-four pounds in weight, chiefly under rain-baths at 65° F. (18.3° C.), given for spaces of one-half to three minutes.

Conrad Clar, of Gleichenberg, ¹⁰⁰¹_{Feb.} knows no better remedy for aborting a descending bronchial catarrh than the cross-bandage (a damp-linen compress, covered with flannel, enveloping the chest like a figure of eight). When the infiltrations begin to shrink and a retrograde process has begun, douches are of the greatest benefit,—brief, strong, and not too cold at first. They are best given after a preliminary warming up in the hot-air box. In order to obtain certain reaction, the single rays of the douche must strike the body everywhere perpendicularly. For this reason, Clar usually applies a movable, finely-perforated metal ring, in whose centre the patient stands and from which, at first, a brief rain strikes him under the axilla. The stream is directed upon the feet, and thence up and down the body, until a hyperæmia of the skin indicates relief to the inner organs. If there are no catarrhal manifestations, a half-bath follows, and then some definite muscular exercise, expressed in kilometres. Then the lost heat is reproduced, tissue-change is enhanced, and appetite increased. In asthma, he has also found the hot-air bath, followed by the ring-douche, very valuable. This douche is not given with less than three atmosphere's pressure, furnished by compressed air acting upon the reservoir containing the water.

Catarrhal pneumonia, non-bacillary, which frequently follows measles and pertussis in children, also yields to the treatment, combined with bland milk diet.

Winternitz ¹⁰⁰¹_{Mar.} urges that care be taken not to employ more powerful thermic and mechanical procedures than the system is capable of bearing without excessive reaction; the temperature must not be reduced below normal, and it is advisable to adopt a

preliminary heat-accumulating procedure, or apply it just after arising from a warm bed. If a cold rub-down or pack is used, the temperature should be 50° to 60° F. (10° to 15.6° C.); higher temperatures are neither more agreeable nor less taxing. If the heat is strong, the patient should exercise afterward, otherwise lie down with open window, well covered and breathing deeply. Free breathing of fresh air is the chief element in the treatment of phthisis. The main obstacle to this is the liability to cold, and a rational water treatment insures the patient against this. Repeated methodical, thermic, and mechanical irritation tends to diminish the reflex irritability of the peripheral cutaneous nerves. This neuro-vascular discipline (see Baruch ²⁰⁶¹_{p.442}) not only protects the system against sudden changes, but acts curatively.

A severe case of neuritis, successfully treated by cold douches, is reported by J. Dubrisay, of Paris. ¹¹⁶_{Dec., '91} The patient was a married woman, 26 years old, who first suffered from cardiac trouble and began to emaciate in November, 1890. Attacks of diarrhœa and vomiting occurred frequently; amenorrhœa, anorexia, continuous thirst, sleeplessness, and apathy were also present. The patient was unable to maintain an upright position on account of the extreme pain and weakness. She always walked on the heel (Romberg's symptom), and the patellar reflex was wanting. She was analgesic and anæsthetic over the entire surface of the body. She was addicted to the use of alcohol. The treatment consisted of tonics, opium, and chloral to produce sleep and paregoric against the diarrhœa. The chief means of cure were cold douches of twenty-five to twenty seconds' duration, once or twice daily. Alcohol was permitted in moderate quantities, the thirst relieved by a decoction of wild chicory or cinchona, and 2 litres (2 quarts) of milk given per day. Under this treatment the patient was perfectly restored.

Winternitz ¹⁰⁰¹_{Jan.} relates his vast experience in the hydiatic treatment of neuralgia. Of 585 cases received into his institute during twenty-five years, 52 per cent. were cured and only 5 per cent. were failures, the others being more or less improved. Hydrotherapy was one of the most valued remedial measures. A tic douloureux of several months' standing was cured by a single rain-bath at 50° F. (10° C.). Such a result is rare, but recoveries, after a few treatments, are not infrequent.

Otto Pospischl refers to one hundred and thirty-five cases of sciatica in which only 6 per cent. failed to yield to hydrotherapy, 57 per cent. being cured and 37 per cent. improved. Von Fodor, ¹⁰⁰¹_{Aug.} while in temporary charge of Winternitz's department of the Vienna University clinic, demonstrated the value of hydrotherapy, in a case of enlargement of the spleen, to a number of physicians. The case was entirely cured by two douches, after treatment for two months for malarial fever by quinine, which always acted well, but only for a short time. He received a rain-douche of thirty seconds at $54\frac{1}{2}^{\circ}$ F. (12.5° C.), followed by a fan-douche to the spleen, which immediately shrank, as demonstrated by percussion. [The same observation had been formerly made by Botkin.—ED.] He had a chill and fever in the afternoon. On the 15th he had another douche. The fever did not return and his color improved, as the physicians present could testify. He did not return for treatment; but an accidental meeting one month later showed him to be entirely recovered. A second case, a quotidian of two years' standing, which had resisted the usual treatment, is also described. In order to accustom the patient to the treatment, by which von Fodor only expected to restore the general health and enable him to render quinine useful, he gave him a half-bath of four minutes, at 86° F. (30° C.), reduced to 77° F. (25° C.), with strong friction. The attack remained absent after this. The patient continued treatment by daily half-bath; later, cold rub-down and brief cold rain-douches. He improved rapidly, gained weight, and the spleen could no longer be felt. Four additional cases are cited, one quotidian of a year's duration. Five days' rain-douching were of no avail. As it was important, according to Fleury, who had recorded similar successes long ago, to apply the treatment just before a paroxysm, a cold sitz-bath was recommended, with active frictions of back and chest with cold water. He received a morning douche and evening sitz-bath. This prevented an attack, and the patient improved.

Buxbaum ¹⁰⁰¹_{Feb.} relates cases of uncontrollable vomiting, dysmenorrhœa, and parametritis in which hydiatic procedures proved valuable after failure of other remedies. In a case of vomiting of pregnancy the whole arsenal of the usual pharmaceutical agents had been employed unsuccessfully. Winternitz's novel method of placing a damp, cold compress around the waist, and covering

the epigastric region with a coil through which hot water was made to flow, proved as efficient as it had done in Winternitz's ¹⁰⁰¹_{V.1, No.1} cases. The patient retained some kefir. On the succeeding days the apparatus was applied half an hour before eating. In four weeks recovery was complete. In dysmenorrhœa a similar procedure was carried out, beginning three days preceding the flow, and continuing throughout the menstrual period.

Semmola treats certain skin diseases, as eczema and psoriasis, by means of baths at a temperature of 77° to 95° F. (25° to 35° C.), and of two to three hours' duration, for four weeks, followed by Scotch douches, which are continued during the winter. The chief aim is to maintain the functions of the skin, despite the cold season. The diet is also modified; milk is given abundantly, meat, eggs, and other nitrogenous food in small quantities. Lassar²⁰⁶⁴ has treated over ten thousand cases of eczema with baths, and believes that they are not always injurious, and should not always be positively forbidden. Saalfeld urges that, whenever we wish to produce a macerating effect, diminish infiltration, and calm irritation, baths are indicated; in the acute inflammatory stage they are contra-indicated. No remedy is so useful in chronic, dry, infiltrated eczema as the warm bath, to which alkalies, soap, or tar may be added. In the thickened, eczematous palms and soles warm alkaline baths are most effective. Prurigo improves under baths, also ichthyosis and lichen planus. Jaquet⁷³_{No.17} finds douches useful in the latter. Regarding the physiological action of hyriatic procedures, Vinay, of Turin,⁸⁷⁰_{Jan.16,'91} demonstrated, by an apparatus which allowed of changes in the temperature and pressure of the douche, that the purely mechanical element produced the same effect as the thermic in narrowing the vascular lumen. For reflex effect upon the circulation, it is therefore not necessary to use very low temperatures or extraordinary pressure. The favorable effect of cold douches in hysteria and the beneficial results of the milder douches in chronic spinal diseases are well known.

Maggiora and Vinay¹⁰⁰¹_{Jan.} contribute a series of experiments demonstrating that hyriatic applications produce a powerful influence upon the muscular system, depending upon thermic as well as mechanical action. Cold enhances the capacity of the muscles for work, warmth diminishes it. When combined with mechanical influences, the latter also enhances muscular capacity, but the

enhancement is less than the purely mechanical procedure, and still less than the cold, or alternating cold and hot procedures. The maximum is reached by cold applications combined with mechanical effect.

The hygienic value of hydrotherapy in childhood is the subject of a paper by J. Matas.⁴¹ He adduces the following aphorisms: The cold bath may be regarded as a gymnastic measure, which strengthens the body, favors transpiration and secretion, and prevents disease. It hardens children against cold, and is attended by no ill effects if carefully used. It is a powerful tonic and energetic alterative in chronic diseases; prevents catarrh and rheumatism. The best hydiatic measures are general sponge-baths for the spring and douches for the summer and winter. The beginning should be made with tepid baths. Children of any age may be safely bathed; the more general use of baths will certainly reduce the mortality. Hydiatic procedures must be of short duration,—not exceeding one minute. Friction, massage, hydrotherapy, sun-baths, and gymnastics represent the best means of invigorating a weak and lymphatic constitution. The judicious employment of both in childhood is a necessary adjunct in any properly directed system of education.

The douche is fully described, and its therapeutic indications furnished by Simon Baruch, of New York,²⁰⁶⁶ who refers to the fact that this method of treatment has been successful in the hands of the French physicians—Charcot and others—in cases resisting all other treatment. The effects obtained are mechanical and thermic; the douche is a discipline for the peripheral nerves and vessels, producing an ebb and flow and reflex actions unattainable by medicinal agents. Baruch describes and illustrates the apparatus of the Hydiatic Institute in New York. There are means for exactly guaging the temperature, duration, and pressure of the water. In phthisis the rain-bath (which is a universal douche) of 65° to 75° F. (18.3° to 23.9° C.) is of value, administered daily for a few seconds to two minutes; it relieves pyrexia, improves appetite, deepens respiration, and refreshes the nervous system. In neurasthenia and hysteria of the depressed type, a fan-douche at 45° to 50° F. (7.2° to 10° C.), over the entire body for five seconds, under a pressure of twenty to thirty pounds, is of great value. In the erethetic type of these dis-

eases the wet pack is preferable. In chronic gastric troubles, with anæmia, a douche at 65° to 75° F. (20° to 23.90° C.), under twenty pounds' pressure for five to thirty seconds, or a rain-douche, has succeeded after failure of medicinal agents. In anæmia, chlorosis, obesity, chronic rheumatism, and gout striking curative results have been obtained by hot-air baths in boxes, followed by cold douches. In locomotor ataxia, and other cerebral and spinal lesions, the cold douche must be avoided. Precision is important; the physician must exercise his judgment in the use of this most orthodox remedy.

An editorial⁹⁰⁶_{May} formulates the claims of water as a remedy as follows: 1. Its action may be explained on rational principles. 2. It is susceptible of exact dosage, varying from 40° to 110° F. (4.4° to 43.3° C.), one to forty pounds' pressure, and one-half second to any number of minutes or hours. 3. Its value has been proven by clinical tests.

Draper⁹⁰⁶_{May} claims that the mineral springs owe their chief value to the water, and not to the mineral constituents.

Winternitz¹⁰⁰¹_{July} has labored with his accustomed zeal to arouse the profession to a recognition of the value of the hydiatic management of cholera. Aside from the cleansing value of baths in the prophylaxis of cholera, we find, in their thermic and mechanical effect upon the organism, the fulfillment of every indication. A rub-down with a dripping sheet, water at 50° to 60° F. (10° to 15.6° C.), wrung out or not, as may be required, or a half-bath for more robust individuals, of 68° to 77° F. (20° to 25° C.) for two to five minutes, or a strong rain-bath of one-half to one minute, are the best prophylactic procedures, especially if taken on rising from bed and followed by exercise in the air. Winternitz refers to Watson's observation that people accustomed to cold morning baths were exempt from the scourge, and cites numerous German authorities to the same effect. The premonitory diarrhœa must be combated at once, and for this purpose he recognizes no more sure, prompt, and unfailing remedy than baths. The cutaneous vessels are dilated, producing a fluxion to the skin, thus relieving all the internal organs. The effect of cold applications upon the innervation is marked; the heart becomes more vigorous, and the increased tone of the splanchnic nerve affords a powerful contraction of the enteric vessels. The general blood-pressure is raised

and the entire circulation invigorated. A vessel having increased tension must offer greater obstacles to the transudation of its contents. This is the chief reason for the great value of hydrotherapy in all forms of diarrhœa. The most simple method is the rub-down with a sheet wrung out of very cold water, followed, without drying, by a sitz-bath of 50° to 60° F. (10° to 15.6° C.), of fifteen to thirty minutes' duration. The patient must be well covered in the bath with a woolen blanket, and must, as far as he can, rub himself actively in the water, otherwise friction must be practiced by an attendant. A strong spray-douche directed to the abdominal wall for one to one and a half minutes, followed by a sitz-bath, is also valuable. These procedures must be followed by a moist, well-applied abdominal compress, and the patient must be well rubbed and dried. Reaction and profuse diuresis usually occur. Even in the pronounced stages of cholera these measures have afforded rest to the patients and often diminished the intensity of the attack. They are to be repeated as often as necessary.

Winternitz cites forty cholera fugitives who came to his institution in 1866, and many cases treated by him in Vienna during two epidemics. All the clinical manifestations of cholera demonstrated that it is due to paresis of the intestinal nerves and vessels. Hence, the chief indication lies in the powerful excitation of the sympathetic nerve and its circumjacent vessels, even if common toxins are their cause. It is agreed upon all sides that no remedy acts so powerfully as cold and mechanical friction upon vessels and nerves, especially upon those of the abdominal cavity. Excitation of the nervous system has long been in vogue in the treatment of cholera, by means of cutaneous irritants, as mustard, frictions, hot packs, etc. These, as well as medicinal agents like camphor, etc., have failed in most cases. Theoretical considerations would demand rapid applications of intense heat, but these reduce vascular tone and pressure and produce passive hyperæmia. Romberg's unfavorable experience with steam-baths proves this. Cold applications act quite differently, but they should not be used *in extremis* only, nor should they remain in the hands of specialists; and for the third time does Winternitz insist that they should become the general property of physicians.

Buxbaum¹⁰⁰¹_{Aug.} concludes that experience and statistics have

authentically demonstrated that hydriatic treatment is of great value in cholera.

HYGIENE AND EPIDEMIOLOGY.

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AND

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HYGIENE.

General Considerations.—J. F. Alleyne Adams, of Pittsfield, ⁹⁹_{July 14} details the results of sanitary legislation since the establishment of the Massachusetts State Board of Health in 1870. He expresses his "disappointment at finding that the death-rate of Massachusetts has remained practically unchanged. The average for the past forty years has been 19.35 per one thousand, while for 1890 it was 19.44, a trifling increase. Dividing this period of forty years into decades, we find the average death-rates for each decade to be 18.24, 19.43, 19.81, and 19.59. Thus there was a slight increase in the death-rate, which reached its maximum in the third period. The average for the fourth decade was slightly less than the third, and yet was higher than either the first or second. The best that can be said is, that the upward tendency was arrested about 1884, since which time there has been a slight irregular downward tendency." He finds, on examination of the statistics, that certain diseases have a decreasing and others an increasing mortality, the gain and loss nearly balancing. The zymotic diseases, as a class, have diminished from 474 to each 100,000 in 1870, when the State Board of Health began its work, to 360 to each 100,000 in 1890. This is equivalent to a saving of over 2500 lives in 1890. The death-rate from consumption is included in the class which has declined. Bronchitis, pneumonia, cancer, and diseases of the brain, heart, and kidneys have all increased in mortality in each decade since 1850. The most remarkable increase is shown in the case of bronchitis and pneumonia, the death-rate from which was more than three times as great in the last decade as in the first. The second general

feature which characterizes these two groups of diseases is this: that the diminishing diseases are chiefly those of early life, while the increasing diseases are those of later life. He concludes that, although the death-rate has not actually decreased, yet sanitation has resulted in the reduction in mortality of preventable diseases amounting to 30 per cent. in twenty years,—a condition which is overcome by the development of new types of disease affecting the human race.

Edwin Farnham, of Cambridge, Mass., ⁹⁹ July 28 has compiled a table of mortalities for that city covering a period of forty years. It is interesting, as it relates to an old New England university town, having few manufactories and a small foreign population, the inhabitants generally living under good hygienic conditions:—

CAMBRIDGE—MORTALITY PER 1000 LIVING IN FIVE-YEAR PERIODS.

DISEASE.	1851-55.	1856-60.	1861-65.	1866-70.	1871-75.	1876-80.	1881-85.	1886-90.	Mortality per 1000 Living 1851-90.
Cancer	0.30	0.28	0.22	0.29	0.29	0.43	0.55	0.61	2.42
Diarrhoeal diseases	3.42	2.25	2.71	2.94	3.39	2.52	1.78	1.91	2.48
Diphtheria and croup	0.64	0.62	0.98	0.66	0.54	1.58	1.42	1.07	1.03
Measles	0.31	0.18	0.11	0.09	0.18	0.02	0.08	0.19	0.13
Phthisis	3.97	3.89	3.20	2.93	2.97	2.81	3.16	2.62	3.04
Scarlet fever	0.51	1.41	1.36	0.77	1.31	0.35	0.25	0.20	0.65
Typhoid fever	0.35	0.34	0.14	0.37	0.52	0.21	0.30	0.34	0.35
Whooping-cough	0.40	0.15	0.17	0.14	0.26	0.16	0.14	0.19	0.19
Diseases of circulatory system	0.47	0.59	0.70	0.65	0.78	0.71	1.19	1.12	0.86
Diseases of digestive system	0.19	0.20	0.38	0.29	0.52	0.55	0.64	0.67	0.49
Diseases of nervous system	2.34	2.07	2.70	2.21	2.66	2.49	2.70	2.58	2.51
Diseases of respiratory system	1.07	1.19	1.79	1.67	2.45	2.34	2.99	2.48	2.22
Diseases of urinary system	0.11	0.03	0.19	0.21	0.28	0.50	0.61	0.65	0.41
All causes	20.46	18.99	20.82	17.72	22.16	18.35	19.59	18.75	19.48

DISINFECTION.

A. J. Martin, ³⁶³ May 28 gives the progress that has been made in France, by public and private measures, toward securing the disinfection of rooms and articles of all kinds used by persons suffering from any of the infectious diseases. The methods principally used are steam sterilization under pressure, in chests made for the purpose, and the lever atomizers.

The burning of sulphur is falling more and more into disuse, as being injurious to articles of clothing and furniture and preventing the use of rooms for some time, and also as being of doubtful value. A solution of bichloride of mercury, 1 to 1000, to which is added tartaric acid, is principally used with the

atomizers. There are now two hundred and seventy-two sterilizers and three hundred and seven atomizers in use in France, mostly under the control of the city health or hospital corporations. In cities adopting the system, disinfection is made obligatory by ordinances, in cases of death from any of the infectious diseases, including all forms of tuberculosis, or in cases where the disease has existed and been followed by recovery. The Paris municipality has provided three disinfecting ovens where the public can have bedclothes, wearing apparel, etc., disinfected free of charge on applying at any *mairie*, cemetery, or municipal ambulance station. Medical practitioners are supplied with packets of post-cards, the dispatch of one of which will cause steps to be at once taken carrying out any required disinfection. A special conveyance, hermetically closed and under the care of attendants in distinctive uniform, is sent to the house indicated. After disinfection, the things are brought back in a different vehicle.

In Paris and Bordeaux there also exist private establishments for performing this work. The proprietors of Mediterranean hotels where many consumptives go have provided themselves with portable apparatus for regular use in disinfecting rooms occupied by such patients. Alfonso Montefusco and Orazio Caro have published⁸³⁰_{Nos. 10, 11, '91} a monograph on domestic disinfection by ordinary lye. After an immersion of twelve hours in a solution of boiling lye, cholera and typhoid bacilli and charbon spores were invariably destroyed. If the solution were kept at a temperature of 20° C. (68° F.), sterilization resulted in six hours; at 50° C. (122° F.), one hour's immersion produced sterilization; the spores of charbon were not destroyed in one, two, or less than six hours at a temperature of 100° C. (212° F.), whereas in that time the same result was obtained at a temperature of 25° C. (77° F.). The alkalinity of a litre of this solution of lye was exactly neutralized by 315 cubic centimetres (11 ounces) of a normal solution of pure oxalic acid. Wood-ashes of lye of the same alkaline strength may be substituted for quicklime. The addition of 2 per cent. of whitewash containing 20 per cent. of lime to typhoid or cholera stools will completely sterilize them within an hour. The whitewash must have an alkaline reaction. It should be well mixed with the faeces. L. Pfeiffer⁶⁹_{Sept. 1} describes patterns of several stationary and portable steam disinfecting chambers now in use in Germany.

S. W. Abbott, of Boston, ⁹⁹_{Sept. 22} urges the importance of establishing public disinfecting stations in the United States, modeled after the establishments lately erected in Paris and Berlin. "Such stations," he says, "would not only prove useful in case of the invasion of cholera, but very much more so in the case of those far more destructive diseases which are constantly present with us,—scarlet fever and diphtheria, and also typhus, if it should ever find a foothold among us."

Cranberg ³²⁴_{B. 13, H. 3} directs his attention to the best means of ridding carpets, walls, tapestries, etc., of infectious matters that might have been deposited upon them. To this end different sorts of carpets and walls, both painted and otherwise covered, were infected with *staphylococcus pyogenes aureus* and with fresh tuberculous sputum. After drying, the infected paint was rubbed or wiped down with sponge, chamois-skin, rubber, or bread. Bacteriological studies of the points thus freed from infection were then made. Sponge was seen to be the best agent. It should be slightly moistened before using. With whitewashed walls the safest treatment is to give them a fresh coat of the wash.

The Royal Minister of the Interior of Würtemberg issued instructions in February, 1892, ²²_{Mar. 2} regarding measures to be taken against the spread of tuberculosis in the workhouses and prisons. In the first place, it is directed that in all parts of the workhouses suitable spittoons be placed, each provided with a thin layer of water at the bottom. These spittoons must be emptied, if possible, daily in the closets, and afterward rinsed out with hot water. Inmates and attendants are to be strictly compelled to use the spittoons, and to keep the different parts free from all expectorated material. If the floor or walls be soiled by expectoration, it is to be cleansed with hot water, or in some other suitable way. Tuberculous patients are, as far as practicable, to be kept apart from the others, if possible, in a special room. Rooms that have been occupied by tuberculous patients are to have their floors and walls thoroughly disinfected before others are permitted to occupy them. For this purpose walls and floors not painted are to be fresh whitened, and, where covered with paint, washed with hot water. All linen used by tuberculous patients must be thoroughly boiled. All rooms occupied by tuberculous cases must be washed. The above orders also apply to the prisons. The visiting medical officers, both in

their treatment of the sick inmates and in their official visitations, are instructed to see that the foregoing regulations are carried out. Among other progressive measures in public sanitation, the Medical Department of the Ministry of the Interior in Russia^{251 June} has issued an order that all second-hand articles put up for sale must be disinfected and provided with labels testifying to the act of disinfection. The police surgeons are to be charged with the duty of enforcing this order, and all such articles not provided with the proper testimonials will be confiscated.

Corrosive Sublimate as a Germicide.—Klein's statement made in 1884, that mercuric chloride was of no more germicidal value than vinegar, has received confirmation in the experiments of Charles T. McClintock.^{9 Oct. 1, 8} He found that vinegar containing from 6 to 7 per cent. of acetic acid had as much influence in inhibiting the growth of micro-organisms as a 1-to-1000 solution of corrosive sublimate; that the staphylococcus pyogenes aureus, the bacillus subtilis, Eberth's bacillus, and germs in fæces would withstand a 1-to-1000 solution from one to forty hours. Sublimate forms, with cellulose, silk, albuminous bodies, and some portions of bacteria (probably the envelope), a chemical compound encapsulating the germ, which protects it from the mercury. While this proves a barrier to the growth of the germ, which water will not remove, yet it is dissolved by the salines of the blood. He concludes that while sublimate has no especial germicidal power, yet it may be a valuable disinfectant by reason of its preventing the growth of bacteria in the manner indicated.

SOIL.

The question of cremation still continues to interest not only individuals but municipalities. A deputation, which included civic representatives of Hull, Derby, Macclesfield, Cheltenham, Crewe, Harrowgate, Olkeston, Blackburn, and Southampton, as well as other towns representing the Counsel of the Association of Municipal Corporations, appeared before the Home Secretary of England^{2 Feb. 2} to ask that local authorities might be empowered to use public funds for the provision of crematoria. Such a reform, it was maintained, would be of both a salutary and sanitary description. There was a growing difficulty on account of the progress of opinion in favor of cremation. The general feeling of

the association was undoubted, and many large boroughs had expressed the wishes of their inhabitants by passing unanimous resolutions.

LIGHT.

William McDevitt, Inspector of the Philadelphia Board of Fire Underwriters, in an article on "Some Dangers in Electric Lighting," ⁷⁹_{Feb.} says, "The most important of the existing defects is that relating to fusible connections, as the innumerable variety of alloys used for fuse metal is very misleading, and is still an element of danger. Some of these compositions possess the properties of good electrical conductivity, and are slow to heat; other compositions are of a character exhibiting weakness when heated, resulting in annoyance from continuous breaks, and offering temptations (as has been found) to use ordinary wire in the absence of proper fuses.

"Another universal danger in electric lighting results from the want of some uniform or more ready method of perfecting splices or joints in conductors. Some workmen are in the habit of making loose copper unions, leaving the solidity of the joint dependent on solder, which, being a metallic cement, is liable to be fused by a possible heavy short-circuit occurring on the line, thus melting the solder and leaving a loose connection.

"Probably the most alarming danger exists through the possibility of lightning being conducted into houses lighted by electricity where the latter is supplied by aerial wires. The existence of this danger has been demonstrated where the house wires are attached to gas-fixtures, offering a ready path for the lightning, which, in leaping from the charged wires to the gas-pipes, carries the electric-light current across, forming an arc which pierces the pipe, and where gas is present it will be ignited, causing a steady blaze. If this accident should occur near the ceiling, the building would be endangered."

HEATING AND VENTILATION.

J. O. Webster, of Augusta, Me., ¹⁸³_{Nov. 9} in an article on "School Hygiene," writes as follows: "To keep the air of a school-room in a reasonably pure condition requires the supply of thirty cubic feet of fresh air a minute for each pupil. This involves a change of the air in the room eight or ten times an hour. In our climate

during most of the year this air must be warmed before or after its entrance, and the subjects of heating and ventilation are closely connected. There is also involved the removal of the foul air.

“The air may be introduced through a jacketed stove sitting in the room, a furnace in the cellar, or boxes containing steam radiators in the cellar. The heated air, on entering, seeks the top of the room, and gradually sinks as it becomes cooled, more warm air taking its place. The outlets for foul air should be at the bottom of the room, and must be connected with heated flues unless mechanical power be used. Both inlet and outlet flues should have an area of one square foot for every twelve pupils. An ordinary house furnace will not supply air enough for school-room heating. Large air-heaters are made for this purpose, capable of furnishing large volumes of air heated to about 90° F. (32.2° C.). These are suitable for two- or four- roomed buildings; for larger buildings steam is preferable. For one-room school-houses jacketed stoves must be relied upon, and these are now in the market, for burning either coal or wood. Some very important practical points, which apply to all systems of ventilation, are these: There should be no valves in either the hot-air or ventilating registers, or other means by which the air can be shut off from the room by the teacher during school hours.

“Every heating flue should be provided with a cold-air valve, worked from the school-room, by which the temperature can be regulated by the admission of cold air to the flue, where it will mix with the heated air and lower its temperature when necessary, without diminishing the amount of air supplied to the room.

“All methods of ventilation dependent for their action upon heated flues are more or less defective and unsatisfactory, because their operation depends upon the difference of temperature between the in-doors and out-of-doors air. If they furnish a full supply of air in cold weather, in mild weather their action is impaired from the fact that the velocity of the current is slower. Only mechanical ventilation can be depended upon under all circumstances.”

W. H. Thayer reports ⁷⁹_{Apr.} some experiments made at his request by E. H. Bartley, chemist, of the Brooklyn Health Department, who analyzed the air of St. Ann's Church, in that city, one evening when it was filled by a congregation. The report shows, on the floor, under the edge of the gallery, 19 parts of

CO₂ in 10,000 of the air, while on the gallery, immediately over the place where the first sample was taken, it shows about 40 in 10,000. Duplicate examinations taken on January 3d at the same hour, viz., at the close of the sermon, showed nearly the same results. These results show that the house is not well ventilated, and that, as would be expected, the CO₂ in the air in the gallery is much more than near the floor. Thayer's conclusion, from all the evidence adduced, is that the carbonic-acid gas of respiration and illumination will eventually be equally diffused through the atmosphere, although retained at the upper part of the room so long as the high temperature continues; and that it never, under any circumstances, is precipitated in excess to the lower part of the room.

WATER.

Victor C. Vaughan, of Ann Arbor, Mich. ²³¹_{Sept.} reports the results of his labors in the study of drinking-water the past three years. They were both chemical and bacteriological. During this time he made a study of one hundred and forty-eight samples of water sent him from different places. In most instances they were suspected of being the cause of disease, usually typhoid fever. It has been found that the number of germs in a drop of water varies greatly, and bears no constant relation to the amount of organic matter in the water as determined by chemical analysis. The question of the fitness of the supply as a drinking-water, it was found, could not be answered by the number of germs. During investigation it was recorded in what manner the germ grew on gelatin plates, in gelatin tubes, on agar, on potato, etc.; also the form and size of the germ, its reactions with staining agents, etc.; likewise its effects upon guinea-pigs, mice, etc. Especial attention was given to those characteristics by which it had been proposed to distinguish the typhoid germ from other bacteria found in water.

Many germs present in drinking-water do not grow at a temperature of the human body, and therefore are incapable of inducing disease, including typhoid fever. The water, however, may not be desirable for drinking purposes. Of the germs which grow at 38° F. (3.3° C.), or a higher temperature, some are fatal to animals when injected subcutaneously, others are not. The former are toxicogenic; the latter non-toxicogenic. There is a distinction between non-toxicogenic and pathogenic germs. In the case of

non-toxicogenic germs there is no proof that they could multiply in the animal body. Waters containing such germs have not been positively condemned, although in some cases their use should be discontinued. Some of the toxicogenic germs found in drinking-water produce the same symptoms and the same post-mortem appearances in the animals experimented upon as were observed after the use of Eberth's germ. They not only lived, but multiplied in the animal body. All waters containing these germs are to be condemned. As to the statement that only Eberth's or the so-called typhoid-fever germ would form an invisible growth on potato, this has been shown not to be true, for more than one of the germs found in drinking-water also produced invisible growth on the potato. The tests which have been advanced by Parietti, also that advanced by Uffelmann, for the Eberth germ, are not reliable, since they apply equally to several of those described. Thirty-one of the germs found in the 148 specimens of water were studied sufficiently to admit of their identification. Twenty-four of these failed to grow at a temperature of 38° F. (3.3° C.); 7 grew at this temperature; and of these 7, 4 killed animals when injected subcutaneously, 3 did not.

Alessandro Serafini¹⁵³_{May 10} states that daily observation and scientific research accord in showing that, in the majority of cases, the water of running streams, spontaneously and in a short time, is purified of all abnormal and heterogeneous substances which it has received in traversing a great centre of population. The works of the Royal Commission, the classic report of A. Durand-Claye on the Seine, the chemical and bacteriological analyses of Schellhoss of the Iser, Fleck of the Elbe, Moser of the Main, Franck of the Spree, and Celli and Scala of the Tiber, demonstrate that the quantity of organic substances, ammonia, and bacteria diminishes at a slight distance from the point where they enter the stream, while there is an augmentation of nitrous and nitric acid, indicating that the work of oxidation is progressing. Aëration, in consequence of a continual renewal of air, in no way prevents the development of micro-organisms; and, while it is indubitable that the presence of air is indispensable for the oxidation of organic substances elaborated by the bacteria, that aëration does not alone suffice to accelerate the oxidation. The experiments showed that there was no constant and appreciable differ-

ence between water in which there was continuous aëration from the rapidity of the current and water in which aëration was effected under barometric pressure or the influence of temperature. The action of low temperatures is incontestable in killing, or inhibiting the development of, bacteria; though in large masses of water, if favorable for the development of bacteria, lowering of the atmospheric temperature does not seem to produce any noxious action. In experimental researches and in local observations on water having a rapid or slow current, it may be established that there is a gradual and continued sedimentation of bacteria that is favored by the assistance of other substances held in suspension in the water. It seems that the self-depuration of water is not effected by oxidation processes in the mass of water itself. The rapid diminution of bacteria is due to sedimentation, dilution, the mechanical action of substances held in suspension, the motion of the water, the low temperature, a superficial filtration on the bed of the river, and, perhaps, an inherent action of the water itself. Consequently, sedimentation and dilution produce a rapid diminution of organic substances and ammonia, while there is a rapid but gradual increase of nitrites and nitrates, with a diminution of bacteria.

John Wortabet,⁶_{May 14} in an interesting article on "The Water-Supply and General Sanitary Condition of the Holy Places of Arabia," presents striking facts relative to Mecca and Medina which are pertinent in connection with the cholera of the past year. Wortabet procured a sample of the water from the well of Zemzem, or "Hagar's Well," which was analyzed at the *Lancet* laboratory. A similar sample had been subjected to analysis in 1883.⁶_{Jan. 5, '84} The results show that this "holy well" is still very grossly polluted. The absence of the so-called "albuminoid ammonia" is a striking feature of the analysis, and is probably due to the completion of the putrefactive processes. The nitrates and nitrites are in excessive quantity, and the presence of the latter, which result from the reduction of the former, indicates almost certainly the pre-existence of readily-oxidizable matter, such as sewage. The excessive proportion of free ammonia further testifies to the changes that have taken place consequent on the oxidation of organic matter. Chlorine present in chlorides is extremely high; indeed, the water had a slightly-brackish taste,

and the total solid matter, though considerably less than before, afforded distinct evidence of the existence of phosphate. The two analyses are given below, and, for the sake of comparison, an analysis of the water supplied to London by the Thames companies is appended:—

	GRAINS PER GALLON.		
	Mecca.		London.
	1883.	1892.	
Total solids	464.400	235.200	18.000
Chlorine	75.500	40.700	1.500
Nitrogen as nitrate	13.750	{ 4.550 }	0.180
Nitrogen as nitrite	0.090		None.
Ammonia	0.358	0.140	0.001
Albuminoid ammonia	None.	None.	0.004

Jean Rossi ² June 11 gives an account of experiments made with a view of ascertaining the influence of alkalinity on the number of colonies developing on gelatin-plate cultivations of natural waters. The author very properly points out that numerical results are only strictly comparable when plate-cultures have been made with one and the same specimen of jelly. He broadly confirms the previous results of Reinsch, that the addition of sodium carbonate to the jelly in excess of that required to render the medium neutral leads to the development of a larger number of colonies, and he has also investigated the effect of adding other alkalies. The experiments may be thus summarized:—

ADDITIONS TO BEEF-JELLY.	NUMBER OF COLONIES.			
	Carbonate of Soda.	Carbonate of Potash.	Caustic Soda.	Caustic Potash.
0.00 per cent.	72	72	72	72
0.05 “	133	60	30	73
0.10 “	73	67	0	25
0.15 “	62	53	0	0
0.20 “	55	47	0	0
0.50 “	39	6	0	0
1.50 “	0	0	0	0

It must not, however, be supposed that these figures have any

absolute significance, depending, as they do, upon the particular forms of microbes which happened to be present in the waters experimented with.

A new filter, made from diatomaceous earth, which has had the animal constituents destroyed by heat, is the subject of an investigation by Weyl,⁴_{June 6} who comes to the following conclusions: First, that this filter, after rigorous tests, is found to give a filtrate more certainly free from sediment than any other house filter on the market. Second, it is easily cleaned; the cylinder may be washed with a stiff brush, and later treated with concentrated hydrochloric acid. The fresher and cleaner the cylinder, the greater amount of water is filtered. The cylinder may be easily sterilized by boiling. He thinks that there is no doubt that this filter will intercept the pathogenic bacteria.

In an editorial¹_{Dec. 5, '91} an interesting reference is made to the ancient and modern methods of purification of water, showing that over eight hundred years ago the dangers of decomposing matters in water were well recognized and provided against in practically the same way as by our modern sanitarians. Ebn-Radouan, an Arabian physician of the eleventh century, recommended taking the water of the Nile from places where the current was swiftest and contained the least decomposing matter, allowing the foreign material to subside, decanting the clear water, and further purifying it by means of heat, filtration, and the addition of certain aromatics.

C. J. Rademaker, of Louisville, Ky.,²²¹_{Jan. 16} gives the result of a chemical, microscopical, and bacteriological examination of hydrant- and well- water, made during the months of September, October, and part of November, when the water was the lowest in the Ohio River. The well-water was taken from a wooden-stock pump, the hydrant-water directly from a hydrant in the house. The result obtained is given for 100,000 parts of water:—

Analysis of Hydrant-Water.—Specific gravity, 1001; temperature, 60° F. (15.6° C.); reaction, neutral; taste, flat; odorless; color, slight yellow tinge. Sediment in 100,000 parts, after standing for forty-eight hours in a closed glass vessel, was 13.620 grammes (3½ drachms). This was incinerated and the residue treated with carbonate of ammonia and again heated. This left 10.430 grammes (2⅔ drachms) of inorganic matter. 13.620 — 10.430 =

3.190 grammes (49 grains) of organic matter in the sediment. The water after separation of the sediment was evaporated to dryness on a water-bath, and then heated to 180° C. (356° F.), and allowed to cool in an exsiccator. This left a solid residuum of 12.310 grammes ($3\frac{1}{8}$ drachms). This residue on analysis was found to contain 9.310 grammes ($2\frac{2}{5}$ drachms) of inorganic salts. $12.310 - 9.310 = 3$ grammes ($\frac{3}{4}$ drachm) of organic matter.

Analysis of Pump-Water.—Specific gravity, 1001; reaction, neutral; color, transparent; taste, fresh and palatable; sediment, none. The same quantity was evaporated on a water-bath and the residue heated to 356° F. (180° C.), which left a residue of 39.280 grammes (10 drachms). This on analysis was found to contain 38.130 grammes ($9\frac{4}{5}$ drachms) of inorganic salts. $39.280 - 38.130 = 1.150$ grammes (18 grains) of organic matter.

It will be seen from this that organic constituents largely predominate in river-water, and that the inorganic salts predominate in pump-water. But, as the inorganic constituents are perfectly harmless, we will pass them by without going into details.

Organic Matter.—Free ammonia was estimated according to the method of Frankland and Armstrong, with Nessler's reagent. Organic nitrogen was converted into ammonia by Kjeldal's process, distilled, and Nesslerized. Nitrous acid was estimated by Trommsdorff's method with iodide of zinc and starch; organic carbon, according to the method of Wolf, Degner, and Herzfeld, with the following result:—

HYDRANT-WATER.		WELL-WATER.	
Free ammonia.	0.0040	Free ammonia	0.0010
Albuminoid ammonia	0.0350	Albuminoid ammonia	0.0055
Nitrous acid	0.0010	Nitrous acid	0.0000
Organic carbon	0.5630	Organic carbon	0.3010

SEWAGE AND SEWERAGE.

D. Edgar Flinn, of Kingstown, Ireland,¹⁶ describes the ferozone polarite system, which is of very recent date, its operation being satisfactory.

Ferozone is the registered trade name of the material used in deodorizing sewage and precipitating the solids therefrom. It is rich in salts of iron, alumina, and magnesia, and also contains magnetic oxide of iron in a very spongy and absorbent condition.

By virtue of its soluble iron and magnesia salts it quickly causes subsidence of the suspended solids.

Polarite is the registered name of the material used for further filtering and purifying the ferozone sewage-water from the putrescible matter dissolved therein. It is a black, porous, and magnetic oxide of iron, insoluble in water, and practically everlasting. It is very hard and absorbent. Although consisting chiefly of iron, it does not rust, and its durability is unlimited. A cubic yard of polarite weighs about one ton, and is sufficient for rather more than six square yards of filter-bed; moreover, it is cheap enough to bring it into general use.

It has been in use at Acton for the past four years, and the official reports credit it with being as perfect a system, if not the most perfect, of sewage purification as has yet been devised, the purified effluent being inodorous, non-putrescible, clear, and tasteless, which can be discharged into a river or water-course without any danger or any tendency to undergo secondary decomposition. The process is carried on in two stages, viz.: 1. By precipitating and deodorizing the sewage in settling-tanks by the aid of a magnetic precipitant and deodorant called ferozone. 2. By passing the partly-purified sewage effluent from the settling-tanks through polarite filter-beds, which arrest any solids remaining in suspension, and oxidize and render innocuous the putrescible matter held in solution.

In carrying out the process of purification by this system, the sewage, on reaching the outfall works, is run through strainers to arrest floating solids,—such as corks, rags, etc.,—and then flows quickly through a floating trough into a settling-tank, the floor of which inclines toward the centre so that a gutter may convey the sludge to the outlet-valve. Before entering the tank, the crude sewage receives a dose of ferozone, which costs about one farthing for every thousand gallons of sewage treated. This can be added automatically by placing baskets of ferozone in the flowing sewage, or by using Beloe's patent automatic sewage-mixing machine. In places where the sewage does not flow by gravitation, but has to be pumped, and steam-power is therefore available, the ferozone may be ground with water or sewage in a small edge-runner mill, and added automatically to the crude sewage in a liquid state. The flow of sewage through the tanks should not be continuous, if it

can be avoided. Quiescent tanks are better for precipitation purposes, whatever kind of precipitant be used. When a tank is full, its contents should be left standing for about two hours, so that the ferozone may have time to act thoroughly. As towns differ in the quality of their sewage, the needful period of quiescence may vary in different places. The ferozone will cause deodorization and precipitation to take place in the sewage, and a considerable part of the albuminoids in solution will coagulate and be precipitated with the solids. The supernatant sewage-water thus clarified would then be drawn off and run through polarite filter-beds, which produce a higher degree of purification.

The polarite filter-beds usually consist of six inches of broken stone in which small drain-tiles are imbedded, three inches of gravel, six inches of sand, twelve inches of polarite and sand mixed in equal proportions, and, at the top, a layer of nine inches of fine sand,—making a total depth of three feet of filtering material.

Polarite filters purify tank effluents which have been treated with ferozone at the rate of 1000 gallons (4000 litres) per square yard. Land filters about $1\frac{1}{2}$ gallons (2 litres) per square yard in twenty-four hours; therefore, one acre of polarite filter-bed will do more effective work than six hundred and sixty-six acres of land. Hence the cost is much less than that of a sewage-farm, and at the same time the results produced are more certain. The value of polarite for sanitary purposes can scarcely be overestimated. By using it in small but powerfully-active filter-beds, it is unnecessary to buy large areas of land for sewage farms, which often become a public nuisance. Land is unable to take a continuous supply of sewage without great deterioration in its purifying and aërating properties. It gets clogged and choked with albuminous and glutinous matters, and becomes sewage-sick and inefficient as a purifying agent. Sewage comes every day to be treated, whether the farm is or is not in a condition to deal with it. In wet seasons, when the farm is sodden by rain and wants rest, an increased quantity of sewage comes to be purified.

The polarite filter-bed only requires a few hours' rest occasionally, for aëration and for cleansing the surface sand, which can be done by an improved method at a nominal cost. The polarite never requires to be removed or replaced. Hence it is better to lay down several small beds rather than one or two large ones, so that

they may rest a few hours alternately for aëration and cleansing. The resulting ferozone sludge is comparatively inoffensive in odor, and in this regard has an advantage over the lime and other processes; it has been proved to be richer in manurial value, and the sewage-manure produced by the process is shown by analysis to contain nitrogen equal to from 1 to 2 per cent. of ammonia, besides phosphates; if placed under cover, it dries very quickly, and can be ground into powder. At Acton it is sold as a fine powder at the large sum of thirty shillings per ton, whereas in districts where lime is the precipitant the resulting sludge is carted away as a worthless material. Certainly this system of sewage treatment bids fair to solve a difficult problem; and if the resulting sludge can be made to return a fair revenue, urban and rural sanitary authorities will not be slow to recognize its merits. As a filtering medium polarite appears to have undoubted advantages as compared with sand-filtering material, and it is recommended for filter-beds in waterworks, on the ground of economy as well as efficiency.

ANALYSES OF SAMPLES OF SEWAGE TREATED BY WEBSTER'S ELECTRICAL PROCESS. PARTS PER 1000.

DESCRIPTION OF SAMPLE.	Oxygen Consumed.	Free Ammonia.	Albuminoid Ammonia.	Chlorides.	NOTES.
A.—Mixture of 3 samples of raw sewage collected during time of treatment	2.292	1.90	0.65	44.4	Stank badly on 3d day.
B.—Mixture of 3 samples of treated sewage flowing into tank before settling	0.917	1.75	0.60	37.2	Faint smell on 5th day.
C.—Same as sample A after settling 24 hours . . . . .	. . .	1.61	0.40	. . .	Stank badly on 3d day.
D.—Same as sample B after settling 24 hours . . . . .	. . .	1.84	0.12	. . .	Faint smell on 5th day.
No. 7. Average sample of raw sewage under treatment	2.500	1.80	0.65	41.2	Stank badly on 3d day.
No. 8. Treated sewage after 2 hours' settlement in tank	0.583	1.08	0.07	35.8	Perfectly sweet after 10 days.
No. 9. Same as No. 8 after filtration through 6 inches of sand	0.536	1.00	0.06	35.6	ditto.
No. 10. Treated sewage after 3½ hours' settlement in tank	0.500	1.28	0.05	35.6	ditto.
No. 11. Same as No. 10 after filtration through 6 inches of sand	0.500	0.91	0.01	35.6	ditto.

The treatment of sewage by electricity is the most recent of all methods. Santo Crimp, referring to the Webster electrical process of sewage purification, says, "The time may come when our

towns will be lighted with electricity by night, whilst by day the dynamos will be employed in purifying the sewage." Alfred Fletcher, Inspector under the "Rivers Pollution Prevention Act," states, "The result of my examination of this process has been to convince me of its efficiency in clarifying sewage, of removing smell, and in preventing putrefaction of the effluent. I am of opinion that such effluent as I saw at Crossness can be discharged into a river, or after passing through a thin layer of sand, even into a stream, without causing any nuisance."

The effluent produced by the electrical process, Webster states, contains about 3 grains per gallon of suspended matter, which consist almost entirely of oxide of iron, which is quite innocuous. Where this may be objectionable, from a sentimental point of view, it can be entirely removed by filtration through a few inches of sand. The bacteria question is one which has probably still to be settled, but, in order to obtain some information as to the action of the iron compound produced by electro-chemical decomposition, some experiments were carried out, with the result that, after a given treatment, the whole of the bacteria were killed. In the case of experiments carried out in Paris, with ordinary treatment by means of iron electrodes, the results were as follow :—

	Raw Sewage.	Effluent.
Organisms per cubic centimetre	5,000,000	600

Another new scheme is known as the "Oxygen Process," and was devised by W. E. Adeney and W. K. Parry, of Ireland. The details of this process are as follow: The solid matters are first separated from the soluble constituents by subsidence without chemical precipitation. The destruction of fermentable organic matters is effected by taking advantage of the power which harmless micro-organisms, the germs of which are known to be widely distributed in the earth, air, and water, have, when growing under the most favorable conditions, of rapidly decomposing such matters into carbonic acid, water, ammonia, and also nitric acid. Under proper conditions these products result directly from the decomposition of the soluble fermentable matters in sewage, without any intermediate putrefactive fermentation. The essential conditions for the healthy and rapid action of organisms here referred to is a plentiful supply of oxygen, free or combined. The necessary supply

of oxygen is secured by a careful use of nitrate and manganate of sodium. One of the products of decomposition of the latter chemical is oxyhydrate of manganese; it is completely recovered by subsidence in a second tank, similar in construction to the one employed for the separation of the solid matters of the sewage. The recovered oxyhydrate of manganese may be dried and reconverted into manganate of sodium.

The Shone hydro-pneumatic system is also of comparatively recent date, and is in operation in over forty towns in England. By its aid the "separate system" of drainage can be carried out in the most perfect and sanitary manner possible, whether the district to be drained be flat, low-lying, tide-locked, or otherwise.

ALIMENTATION.

Cows' Milk in Relation to Disease.—Henry E. Armstrong,^{15 Mar} medical officer of health at Newcastle-on-Tyne, holds that milk is a more frequent source of tuberculosis infection than meat, and, in his article on the different diseases communicated to man by this food, attention is "chiefly directed to four of the most important, namely, enteric (or typhoid) fever, scarlet fever, diphtheria, and tuberculosis. The first three of these, when due to milk, generally appear as outbursts, often very sudden in their invasion, and in large dairy customs sometimes attaining the extent of a widely-spread epidemic in a few days. Before the notification of infectious disease became general, these outbreaks were difficult to trace on account of the imperfectness of the information reaching health departments, and the lateness of its arrival." He gives examples of epidemics due to milk. "Ten years ago the editor of the *British Medical Journal* showed that, up to date, 71 epidemics in England had been traced to milk, namely, 50 of enteric fever, 15 of scarlet fever, and 6 of diphtheria, the total number of sufferers being 4800. Since then a great many milk epidemics have been recorded, probably far more than during any previous period, of which the following are only a few examples: Scarlet fever, at Wimbledon, in 1887 (592 cases in two weeks). A small outbreak in Newcastle, affecting 12 of a total of 28 households supplied with milk by a dairyman in whose family the disease had previously appeared. Two outbreaks at Newcastle in 1888; of these, one consisted of 17 cases, during a period of 11 days, in 15

households supplied by one dairyman; the other comprised 116 cases of scarlet fever, sore throat, etc., during a period of 6 days, in 63 households supplied by the same dairyman. The St. Pancras enteric-fever outbreak (London), in 1883, numbered 368 cases in 43 days. The spread of diphtheria by means of milk was first reported on in 1878, by Power, Medical Inspector of the Local Government Board. This outbreak, in North London, caused 230 cases and 30 deaths in 98 households supplied with a particular milk. Subsequent milk outbreaks of diphtheria have been reported on by the medical inspectors of the board in 1882, 1883, and 1886.

“In Newcastle, during the ten years 1881 to 1890, infectious disease of one kind or another has come under our notice on the premises or dwellings of 53 dairymen or purveyors of milk, including 17 invaded by enteric fever, 3 by continued fever, 24 by scarlet fever, 4 by small-pox, 3 by measles, and 2 by diphtheria. From these there has been spread of infection in 5 instances, namely, 2 where the cow-byres were in the city, and 3 where the milk was brought from the country. The diseases spread were: small-pox from 1 dairy, enteric fever from 1, and scarlet fever from 3 dairies. As soon as a case of infectious disease in connection with a dairy business becomes known to the health department, steps are taken to secure the complete separation of the infected premises from the dairy business. The result of this action is shown by the statistics just quoted. The case of small-pox referred to was concealed by the dairy-keeper. Infection spread to four persons living in the same court, causing the death of one, the father of a young family. On investigation, it appeared that the milk-vessels had been regularly taken into the infected premises of the cow-keeper. Seeing the total absence of means of isolating the sick in the houses of most of the cow-keepers and milk-purveyors in a small way of business, it is a wonder that infection has not spread oftener from those 53 houses than it has done.” In considering remedies for this state of affairs he advocates the following:—

“The dairy business should, above all things, be conducted in a sanitary manner. Cow-byres in towns should be done away with, and all others should be under state hygienic control. It is highly desirable that English towns should follow the lead of Copenhagen, whose Milk-Supply Company sells the yield of upward of

4000 cows owned by forty-nine contractors. This immense business is carried on on hygienic and philanthropic principles, under the management of a committee of experts who have no share in its profits. The statutes of the company provide that any profits over 5 per cent. shall go to reduce the price of milk. Every available means is taken to procure milk of the purest quality. The company pay a higher price to the contractors than can be obtained elsewhere. The cattle are examined every fortnight by veterinary inspectors, who note all particulars bearing on their health, their yield; the kind and quality of their food, etc.; the condition of the farm, the due observance of the rules, etc. The regulations apply to feeding and management, milking and cooling of milk, delivery, etc., and are very complete. Those relating to cleanliness are minute and stringent. All milk and cream is filtered. The contractor is bound to report any case of disease, and, if necessary, withhold his milk, which is, nevertheless, paid for as usual if the conditions are complied with."

Edward F. Brush, of Mount Vernon, N. Y., deals with the same subject,⁹⁴⁶_{Sept.} and takes practically the same ground, concluding thus: "The chronic forms of tuberculosis in the dairy cow are not easily recognized; the medical man knows little or nothing about the cow, and, as the American veterinary schools have paid less attention than the subject deserves, there are few people who are able to detect the earliest symptoms. The necessity for more definite knowledge of the cow herself by all practitioners is evident, so that, when it becomes necessary to prohibit the use of food that is apt to kill, there should be more people able to detect the morbid conditions at work in the food-producing animal. We can safely assert that in our time tuberculosis will not be entirely eliminated from the dairy cow. We are approaching the period when it will be; therefore, meanwhile, let us guard the susceptible, and aid in the advance toward the annihilation of one source of danger to the human race."

E. P. Christian, of Wyandotte, Mich.,¹⁸⁵_{Aug.} reports personal experience with an epidemic of typhoid fever—eleven cases and two deaths—directly traceable to milk infection. He concludes his article in the following words: "If it has happened to one member of this society to have traced to this source, within a little more than one year, two local epidemics of typhoid fever in separate

localities and originating from the milk of different animals,—and intercurrent cases of diphtheria may have originated from the same source,—then, how many epidemics, in the aggregate, have had a similar origin; and how many of the sporadic cases of these diseases, and especially of scarlet fever and of diphtheria, which are always among us, are originating from this source?"

Many people opposed to the use of intoxicating beverages drink milk. It would seem, therefore, a practical question for the temperance people to concern themselves about the hygiene of the milk-supply of large cities. If the dangers from diseased milk be generally known, it would seem a difficult task to induce men to abstain from the use of intoxicants as a beverage in business hours.

J. W. Exline, of Denver, Col.,¹⁵⁵_{Sept.} in speaking of the relations of milk to tuberculous disease, says, "I think it very significant that a coincidence is found to exist between the prevalence of phthisis and the dairy industry. This has been observed of Switzerland, Spain, Portugal, China, Australia, Egypt, and some of the Pacific islands. If the use of such beef and milk is specifically prejudicial to health, how important that the countries of all the world are speedily advised of it."

Ilkewitsch³⁴_{Feb. 2} describes a new method for the detection of tubercle bacilli in milk, which is founded on the fact that tubercle bacilli will be precipitated by rapid centrifugal motion. He uses a modified lactocrit, which has 3600 revolutions a minute. Twenty cubic centimetres ($5\frac{2}{3}$ drachms) of milk are coagulated by means of dilute citric acid. The whey is separated by filtration. The casein is dissolved with phosphate-of-soda solution. To this are added 6 cubic centimetres ($1\frac{2}{3}$ drachms) of sulphuric ether, mixed with water, in order that the emulsified fat-corpuscles may be set free. The action of the ether is hastened by shaking the mixture in a glass cylinder for fifteen minutes. The solution is allowed to stand, and after the fat has separated the remainder of the liquid is allowed to run out. Dilute acetic acid is added to this until the first sign of coagulation. It is then transferred to the lactocrit, and the machine set in motion for fifteen minutes. The vast majority of the bacilli then sink to the bottom. This deposit is then conveyed to two slides, stained, and examined with an oil immersion lens. If bacilli were present in the milk, they will be found almost

surely in this precipitate. The author considers this method more certain than the inoculation of animals with the suspected milk.

Sterilized Milk.—From the report of the New Jersey State Dairy Commission²¹⁶⁵ we learn that the chemical changes induced in milk by sterilization are much greater than were supposed. The chief changes now known are the following: 1. As regards the destruction of germicidal power, careful experiments have shown that when a known number of cholera germs, for instance, are placed in fresh milk, there will be a less number to be found at the end of three hours than at first. Not so if it has been sterilized. 2. The lactalbumen in the milk, which is closely allied to serum-albumen, is coagulated by heat, whereby the milk is rendered more viscous. This albumen is thus rendered less soluble and seemingly more difficult of digestion, and is the cause of change in the flavor of the milk. 3. The starch-fermenting power of the raw milk is lost,—a property of value in the digestion of an infant, whose saliva has not yet acquired that power. 4. The milk-sugar is changed, undergoing a degree of caramelization. 5. The fat in the milk is more or less freed from its emulsion, so as even to be found sometimes collected into drops upon the surface of sterilized milk. As the fat must be in an emulsion to be absorbed from the intestines, the digestive organs have the task of restoring this. 6. The casein is also affected, as proven by its being less easily and completely precipitated by rennet. According to Baginsky, it requires more rennet and a higher temperature, and according to Soxhlet, the addition of some lime-salt. In experiments of artificial digestion the casein is found to be less readily acted upon by pepsin and pancreatin. Milk, therefore, which has been sterilized, is certainly no longer the original natural product in other respects than being free from bacteria. Whether it will prove to be as desirable a food remains to be seen.

Tuberculosis in the Sheep and Goat.—W. Alston Edgar, of Dartford, Eng.,^{521 Mar.} reports an interesting case of tuberculosis in a goat about 5 years old. She had a kid in April, 1891, which was weaned in due time, and she continued in milk up to the end of October, being then in a fat condition. “The illness commenced about the middle of November, and at the end of a fortnight the animal, being utterly prostrated and refusing all food, was destroyed by order of the owner, J. F. Egerton, Esq., estate officer, Tatton

Park, Knutsford, who forwarded the lungs to me for examination, he being of opinion that it was tuberculosis. Unfortunately, the abdominal viscera were not forwarded, but Mr. Egerton remarked that 'the liver contained white patches, which he thought were abscesses.' The lungs were uniformly studded with grayish-yellow nodules, no portion of either lung or lobes being healthy. There were no deposits on the pleura. The bronchial lymphatic glands were enormously enlarged and hardened. The mucous membrane of the bronchioles was, in some parts, thickened; the lumen was blocked with mucus, and contained a few strongyles. I forwarded a portion of lung and lymphatic gland to Professor M'Fadyean, who reported immediately that the lymphatic glands contained tubercle bacilli, and a few days later, having examined the portion of lung, said, 'It shows no lesions save those of tuberculosis. The little nodules are typical tubercles, showing giant-cells, caseation, and tubercle bacilli.' There is no evidence to show how this goat became infected."

This is probably the first fully-authenticated case of tuberculosis in one of the smaller domestic ruminants. No doubt there are previous records of the alleged discovery of tuberculous lesions in these animals, and especially in sheep, but we do not know of a single one in which the correctness of the diagnosis is not open to considerable doubt. The miliary nodules that frequently form around animal parasites in the sheep's lung may readily be mistaken for true tubercles; and animal parasites, such as the *Strongylus rufescens*, are sometimes the cause of a pulmonary lesion that, to some extent, simulates an actual phthisis. Hence, in any case of alleged tuberculosis in the sheep or goat, unless the diagnosis has been verified by microscopic examination, some doubt must remain as to whether the disease was really of a tuberculosis nature.

Tuberculous Meat.—In nine out of eleven cases, Kastner ³¹_{May 17} obtained positive results by the injection of the juice expressed from the confiscated flesh of seven tuberculous animals. The injections were made into the abdominal cavities of guinea-pigs, the juice of fresh flesh with no naked-eye appearances of tubercle being alone used. If an inflammatory condition had been previously induced by the injection of ammonia, the development of tubercle was more marked, and spread in each such case to the lungs. In the light of his previous experiments, the author says

that complete calcification of the tuberculous processes in the animal would appear to render the chances of infection slight, but if caseous masses are found the danger of infection must be admitted. He is of opinion that the estimation of this danger of infection must thus be based upon the morbid anatomy, and that a thorough inspection must be made. In an editorial postscript the observation is made that, according to a quite recent Prussian rescript, the flesh of tuberculous cattle is looked upon as dangerous to health, either when the flesh contains tuberculous nodules or when the tuberculous animal is wasted, even if no such nodules are present in the flesh. The great infrequency of tuberculous nodules in the muscles is also referred to.

Hippophagy in France.—Ch. Morot has published a report²¹⁶⁴_{No. 195, vi} on the progress of hippophagy in France since 1866, when the first butcher-shop for horse-meat was opened in Paris. In 1887, 40,000 solipeds (36,000 horses and 4000 asses and mules) were consumed in the fifty cities of France, the Department of the Seine and Paris consuming 16,446 (only 2758 were consumed in 1869); Toulouse, 3805; Lyons, 3291; Marseilles, 2188; Tours, 1329; Rheims, 1027; Troyes, 917; Dijon, 165, etc. As a rule, the consumption has increased from year to year; for instance, at Toulouse from 1878 to 1887, 26,887 solipeds were consumed,—an average of 2688 a year. The butchers complained that the consumption of horse-flesh was ruining commerce, industry, and agriculture. In Paris horse-meat is sold at about half the price of an equivalent quality of beef; the fillet is fifty cents for two pounds (kilogramme), while meat clear of bone, fat, and gristle costs but thirty cents for two pounds. Hippophagy is on the increase in the cities of Holland, Belgium, and Germany.

Oleomargarin.—This substance has become an important article of food, and its use is rapidly extending; so that it behooves physicians to acquaint themselves with its mode of manufacture, its dangers, and its uses. In a paper on this subject from the pen of G. C. Caldwell, Professor of Agricultural and Analytical Chemistry in Cornell University,⁶¹_{Feb. 13} it appears that caul fat is first cooled and washed, and then rendered at a temperature of 120° F. to 150° F. (48.9° C. to 65.6° C.). The clear fat is then run into wooden tanks, and the greater part of the stearin, the hard fat contained in it, allowed to crystallize out. The liquid fat sepa-

rated from the stearin is called "oleo-oil." A similar product, prepared from lard, is allowed to retain its stearin, and is known by the trade name of "neutral." The "oleo-oil" and "neutral" are then mixed in certain proportions, and constitute "oleomargarin." This substance is free from flavor and color, and to become "butterine" is churned with milk or cream, by which a certain proportion of the flavoring elements of butter are mixed with it, and impart to it the taste and odor of natural butter. Physicians are not concerned with the effect which the manufacture of this article may have upon the butter trade, but are deeply interested in the wholesomeness and the nutritive value of this product. It may be stated at once, that it has not yet been shown to be a medium for the transmission of pathogenic germs, and there can be but little doubt but that it is much cleaner than the bulk of the butter put on the market. Some laboratory experiments as to its digestibility have been made by R. D. Clark, chemist to the New York State dairy commissioner. Clark performed some emulsifying experiments with different fats and pancreatic juice, and found that, next to codliver-oil, butter gave the finest emulsion in twelve hours, while oleomargarin still had many large globules left unchanged. Clark also proved that, while butter melts to a clear, limpid liquid in thirty-five minutes at 100° F. (37.8° C.), oleomargarin was but slightly changed.

It must be admitted, nevertheless, that such experiments show very little, as they are far from imitating the processes of natural digestion. Experiments, however, made by Atwater and others, by Rubner, of Munich, and Mayer, of Germany, show that healthy individuals digest almost as great a percentage of oleomargarin as of butter, the difference—less than 2 per cent.—being so slight as to be unimportant.

It may therefore be conceded that "butterine" is a clean product, very digestible, and not yet shown to be, either directly or indirectly, a cause of disease. And yet its nutritive value is still to be shown. Its constituents are all natural foods, and no doubt perform their usual functions in the organism; but whether they perform the same functions and subserve the same ends as natural butter does is not yet known, and should not be assumed. Sterilized milk differs from raw milk only to a slight degree, from a chemical stand-point; yet the nutritive values of these two sub-

stances are decidedly different. Fresh raw milk contains a something not yet separated by the chemist, but named by our English brethren the antiscorbutic element. This intangible element is missing in sterilized milk, and infants fed upon it are liable to develop "land scurvy" and to present other evidences of incomplete nutrition. This, indeed, is the great danger of sterilized milk, and is the one drawback which prevents its more prolonged use. Butter is a food so extensively used that it can hardly be believed that its use has developed simply as a gratification to the palate, but rather because it adds something to the nutrition which the other fats used as foods do not. It is upon the line of nutritive sufficiency that substitutes for butter must be studied.

Digestibility of Cheese.—It is the general opinion of the laity that the eating of cheese after taking food is an assistance to digestion. This view seems not to be in accord with the result of experiments made by von Klenze.²⁹⁷ He made very thorough tests of the various forms of cheese found in the dietary lists. For the experiments he used an artificial digestive fluid, to which were added 50 cubic centimetres ($1\frac{3}{5}$ ounces) of fresh gastric juice and 3 cubic centimetres (48 grains) of hydrochloric acid. Into this he placed 1 gramme ($15\frac{1}{2}$ grains) of the cheese to be examined. Eighteen varieties were tested, and the following deductions made: Chester and Roquefort cheese took four hours to digest; genuine Emmenthaler, Gorgonzoler, and Neufchatel, eight hours; Romadour, nine hours; and Kottenberger, Brie, Swiss, and the remaining varieties, ten hours. Considering that in a healthy stomach digestion after an ordinary meal is complete in from four to five hours, it would seem, from von Klenze's studies, that Chester and Roquefort cheese were the only kinds that were likely to be digested within this length of time, and that the other varieties, some of which are largely in use, not only did not assist digestion, but actually retarded it.

"Regreening" Fruit with Copper.—A royal ordinance lately issued by the Italian ministry, in connection with the laws relating to the use of colors in food and condiments, admits of the presence of copper in preserved pears, provided that it does not exceed the limit of one hundred parts in the million.

Lehman, of Würzburg,⁸²⁷ before the International Congress of Hygiene, at London, asserted that it had not been proved by a

single well-observed case that copper salts, up to, say, 150 to 200 milligrammes ($2\frac{1}{4}$ to 3 grains) of copper, entering the organism of a healthy adult at one time, if well diluted in the course of eating and drinking, could cause a disturbance in health worthy of any remark. Not a single copper salt which was not combined with an acid, which was itself poisonous, had been proven to have any specific poisonous qualities. Acute copper poisoning had, however, frequently happened through the use of copper vessels containing verdigris. In no case recorded of severe copper poisoning, so called, through the use of copper vessels, had it been shown that anything like the amount of copper found necessary to injure the organism had been taken. Cases were attributed to copper merely because no other poison could be found. Ptomaines and toxalbumens were certainly often the true cause of the trouble. In other cases it had been shown that no reason existed for regarding the small quantities, often mere traces, of copper which were found as the cause of death. From larger quantities than could be taken without being noticed to any extent by the senses, vomiting and purging might occur, but hardly anything more serious. He was, however, in favor of entirely forbidding the useless addition of copper to vegetables, on account of possible injury where quantities of real consequence had been used. Mestre, in his report to the Committee of Hygiene in France, made in 1890, showed that the amount of copper in preserved pears is exceeded in rye, wheat, corn, potatoes, and other natural food.

Colored Blood-Oranges.—For some time oranges have been sold, upon the streets of Paris,³⁵⁹ having the appearance of the popular variety known as blood-oranges. The imitation is so skillfully done as to deceive any one not previously informed. Upon careful examination, however, one discovers the presence of a dye-stuff upon the surface in the cells of the cuticle. In some places the color is concentrated enough to appear as dark-red points. The color proves to be Biberich red, or rocellin, which is a non-poisonous nitro-derivative of amidoazobenzole.

Intoxicating Rye.—Prillieux⁷⁴¹ reports a curious case of intoxication from rye which occurred at a village in the Department of the Dordogne, in France. The bread was made from a sample of rye, and produced remarkable effects, not only in men, women, and children, but in animals of all kinds which partook of it.

These effects were not the same as those produced by ergot, but more resembled alcoholic intoxication. Grains of the rye were subjected to a careful examination by Prillieux, who found them infested by fungi and bacteria of various kinds. The pathogenic effects he believed to be produced by an undescribed species of fungus, the representative of a new genus, characterized by the production of spores within the cells. He names it *Endoconidium temulentum*.

Tannin in Tea.—An editorial writer on this subject ^{Aug. 11} ² says, "Some examples which have been forwarded to us of the results of analyses for tannin and theine in tea indicate considerable variation in the amount of tannin, according to the quality of the tea and the state of growth at which it is picked. In some blends of China teas the percentage of tannin extracted by infusion for thirty minutes was 7.44; theine, 3.11; and a similar result was given in the examination of the finest Moning; while, on the other hand, with fine Assam tea a percentage of 17.73 of tannin by weight was extracted after infusion for fifteen minutes, and two blends of Assam and Ceylon tea gave, respectively, 8.91 and 10.26 of tannin. On the whole, it is probable that the Indian teas are much more heavily loaded with tannin than the China or Japan teas. Moreover, the common method of prolonged infusion in boiling water is well calculated to extract all the tannin, while it dissipates the flavor of the tea. To be drunk reasonably, tea should not be infused for more than a minute, and with water of which the temperature does not exceed 170° F. (76.7° C.). It should be taken without sugar or milk, which would drown the flavor of the delicate and aromatic infusion thus obtained. This at least is how tea is drunk both in China and Japan, whence we have borrowed the use of it. With our European method of prolonged infusion in boiling water we destroy all the best flavor of the tea, and we extract such heavy proportions of tannin as to cultivate indigestion as the result of tea-drinking. Indigestion is unknown among tea-drinkers in the East, and it is in all probability only the result of our defective use of the leaf."

ENVIRONMENT OF MAN.

Infection from the Communion-Cup.—Chas. H. Merz, of Sandusky, Ohio, ²³ ^{Feb.} in an article on "A Possible Source of Disease," calls attention to the subject of the Holy Communion as now admin-

istered in the Protestant Churches by the use of a single cup for general distribution of wine to communicants. He rightly says, "Medical works are replete with instances of infection from mouth and lips. The man who sips from the communion-cup may have a malignant sore throat, be but just convalescent from scarlet fever, or have some dread infectious disease in its incipency. Can it be safe for the communicant succeeding him to press his lips upon the spot where that one's have pressed? The pertinent question is, Has the church or the individual the right to cause the people to incur this risk, at every communion? How the danger—not an imaginary one—can be best avoided I do not pretend to even suggest, realizing that the solution lies entirely with the pastor and his congregation. Various plans have been proposed, and in several instances at least tried, without arousing any opposition." He also notes an innovation, observed in the Scoville Avenue M. E. Church, Cleveland, Ohio, that of administering the wine of the Holy Communion in small individual glasses. This was the outcome of careful deliberation, and with the full consent of the pastor and laymen, and for obvious sanitary reasons.

This is a subject worthy of the careful consideration of the sanitarian.

Disease among Indians.—A. B. Holden, ⁵⁹_{Aug 13} in an article on the sanitary effects of civilization, calls attention to the fact that it is the "transition period" in which the Indian constitution suffers. If he could be given at once a knowledge of the laws of health and then have the best hygienic surroundings, he would undoubtedly be better off than in a state of savagery. "The evils of imperfect civilization and misapplied efforts at civilization, however, are serious enough to deserve careful attention." A decided change of climate, however, does not seem to benefit the Indian; this is shown by many who have been elsewhere to school, and by those tribes that were transferred from one territory to some distant reservation. The author then considers tuberculosis among the Indians. Consumption and scrofula were the causes of 900 out of 1453 deaths reported in 1888. The death-rate from consumption alone is stated by different physicians at from 40 to 75 per cent. "The savage is less liable to become sick or to be injured, but, when sick or injured to the same degree, is more liable to die than the civilized man." In this respect he resembles

the negro. Tuberculosis is found in every Indian tribe. In a few places malaria causes more deaths than consumption. From statistics gathered from agency physicians, it appears that scrofula is often very prevalent where no syphilis can be found, and that scrofula may not be encountered at all in tribes where syphilis is common.

Hygienic Clothing.—Frank H. Daniels, of New York, ¹_{Apr. 23} in an article on scientific clothing, discusses the comparative value of linen, silk, cotton, and wool. He says, “An ideal clothing is one which does not interfere with the functional activity of the skin, while it at the same time protects it against sudden changes of temperature. The normal skin is an excretory as well as a secretory organ, excreting a small quantity of salts, a little carbonic acid, and a large quantity of water in the form of perspiration, both sensible and insensible. The total amount excreted by the skin is large, and has been estimated by Sequin as eleven grains in a minute, or more than two pounds in the twenty-four hours. This excretory activity, or, as we shall call it, the functional activity of the skin, is usually dependent upon vascular dilatation. When the excretions of the skin are diminished, the cutaneous blood-vessels are usually found contracted; and, *vice versâ*, when these vessels are dilated, the excretions become increased in quantity. And by this contraction and dilatation of the cutaneous blood-vessels, with the accompanying variation in the quantity of perspiration, the temperature of the body is largely regulated. It is found that the excretory organs of the human body will do each other's work to a certain extent, and that, if the skin is not acting normally, its excretions are taken care of by the other excretory organs, viz., lungs, kidneys, and bowels. The balance of health is, however, under these circumstances, disturbed, and such vicarious action will not be long tolerated. It will be seen from the above how important is a normal cutaneous function, and how far-reaching is any disturbance of its proper activity. It may be stated as facts, first, that, excluding contagious diseases, all acute forms of diseases may be avoided if the skin is acting properly; secondly, all chronic diseases may be held in check by keeping up the functional activity of the skin.”

After recounting the well-known experiments of Count Rumford as to the conductivity of different materials used for

clothing, which showed that the degree of non-conduction of heat was possessed, in order, first by raw silk, then raw wool, spun wool, cotton, and linen, he proceeds to show that, in order to preserve the absorptive property of wool in the highest degree, the fibres must be arranged with their points against the skin, and not longitudinally as in a woven fabric. This idea has already been recognized and taken advantage of by the originator of the Jaros hygienic underwear. It is unspun wool caught into the meshes of a loosely-knitted cotton back, in such a manner as to preserve unimpaired all the properties which make wool valuable as a clothing fabric.

Factory Women and the Puerperal Period.—In an article advocating legal restraint upon the employment of women in factories before and after childbirth, George Reid, of Staffordshire, England, ²_{July 90} calls attention to the increased death-rate of children under one year, the offspring of women working in the factories of Staffordshire. He says the absence of one month from work, which was imposed by the “Factory and Workshop Act,” is of little practical utility so far as infants are concerned. He submitted the following table of statistics, compiled from the returns supplied by health officers throughout the country:—

STAFFORDSHIRE—AVERAGE RATES IN GROUPS OF TOWNS FOR 10 YEARS,
—1881-90.

	Mean Popula- tion.	Deaths in Chil- dren Un- der One Year per 1000 Births.	General Death-Rate per 1000 of Popu- lation.		Zymotic Death- Rate per 1000 of Popula- tion.	Deaths from Diar- rhœa per 1000 Births.
			Actual.	Hypo- thetical.		
Class I.—Many women en- gaged in work	112,078	195	22.8	19.8	3.17	28
Class II.—Fewer women en- gaged in work	161,560	166	19.4	18.9	2.45	20
Class III.—Practically no women engaged in work . .	165,074	152	18.1	18.1	2.46	19

The British Medical Association, before whom the paper was read, in a discussion which developed considerable difference of opinion as to the proper remedy, some advocating the establishment of *crèches*, others an extension of the present period of one month, finally took the following action: “That the attention of

the Parliamentary Bills Committee of the Association be called to Dr. Reid's paper, and the discussion thereon, with a view to taking action for obtaining parliamentary inquiry into the influence of the employment of women in factories on the mortality of infants."

Bacteriology of Bank-Bills.—In a city in which the mortuary statistics show a large proportion of infectious diseases, every factor that enters into the dissemination of these diseases is of interest. E. Acosta and F. Grande Rossi⁴⁵⁹_{June} have reported the results of their bacteriological analysis of the bank-notes of the Spanish bank of Havana in general circulation. It was found that circulation increased the weight of bank-notes, in consequence of their acquiring foreign matter. The author's bacteriological examinations showed in the notes in use for some time a considerable number of microbes, and in two notes they calculated there were 19,147 microbes. In the notes that were analyzed there existed a septic micro-organism that rapidly killed animals inoculated with it. Besides this, eight pathogenic species were encountered, including those of diphtheria, tuberculosis, etc. The authors therefore concluded that bank-notes were a potent means of transmitting disease, and that their use by children was especially dangerous, because the Havanese children have the habit of carrying the notes in the mouth, and may thus swallow the germs of some mortal disease.

VACCINATION.

Revaccination.—In discussing the period of life at which revaccination should be practiced, Hervieux¹⁰_{Feb.2} concludes a paper as follows: 1. Revaccinations should be made, the first at 10 years, the second at 20, and revaccinations *en masse* in regions which are threatened or invaded by severe epidemics of variola. 2. No one should plead an exception to the rules of the civil or military authorities because of cicatrices of vaccination or of variola more or less marked.

On the 1st of January, 1892, the new vaccination law for Italy¹⁵_{Dec., '91} went into effect. It requires that every child shall be vaccinated before it is 6 months old, and again at 8 years, or at any time whenever the sanitary authority deems it necessary to promote individual or public safety. Those who are not vaccinated and revaccinated according to the requirements of the law, are excluded from schools, factories, workshops, benevolent institutions, etc.

Provision is also made for the cultivation and supply of both animal and human lymph. This has a direct interest for people of America, in view of the large and consequently increasing Italian immigration.

Ancient Hindu Vaccination.—At a meeting of the Epidemiological Society, Pringle ^{Feb. 29} ⁶ quoted a remarkable passage from an ancient Hindu work, which showed that true vaccination was known and practiced in India centuries before the birth of Jenner: "The small-pox produced *from the udder of the cow* will be the same mild nature as the original disease; . . . the pock should be of good color, filled with a *clear* liquid, and surrounded by a circle of red. . . . There will be only a slight fever of one, two, or three days, but no fear need be entertained of small-pox so long as life endures." Pasteur's attenuation of virus by successive cultures has been applied for hundreds of years to inoculations with variolous lymph, which the document in question directed to be taken from "the most favorable cases," and he has seen series of such selected inoculations in which there was no general eruption, and the local phenomena were scarcely distinguishable from those of vaccination.

Lanolin Vaccine.—Surgeon-Major W. G. King, Sanitary Commissioner of Madras, ^{Dec. 1, '91} ²³⁹ contributes a concise report on the results obtained in the Madras Presidency with lanolin vaccine during the experimental issue, from November, 1890, to July, 1891. Concerning the activity of lanolin vaccine, when subjected to the exigencies of transportation and climate, he says, "Surgeon-Major Thompson, lately Deputy Sanitary Commissioner of the Northwest Provinces, when a member of the Leprosy Commission, received a specimen from me when at Madras, on the 13th December, 1890, being a part of that day's issue. During December, 1890, and January, 1891, the paste traveled with him through Madras, Burmah, and Bengal; in February and March it remained in Bengal and the Northwest Provinces. At the end of March it was sent to Simla. It was tested by him at various times with fairly satisfactory results upon children and calves, and with the last remaining portion on the 11th of June a calf was inoculated, and with the fresh lymph derived from this a number of children were successfully vaccinated, *the paste then being six months old.* Its extreme duration has not, therefore, been ascertained. I am of

opinion that if stored so as to exclude air its duration would probably be much longer than six months."

In relation to the success with this material he reports that a supply was issued sufficient for 333,403 cases, with the following result: The total average for the whole thirteen districts, from November, 1890, to May, 1891, including incomplete results for June, was, in 138,435 cases, 89.98 per cent. The total average for the whole of the thirteen districts up to the end of July was, in 214,876 cases, 91.16 per cent.

EPIDEMIOLOGY.

Cholera.—By far the greatest event during the past year has been the cholera epidemic in Asia and Europe and its threatened invasion of America. In the last issue of the ANNUAL (vol. v, E-40) notice was taken of the existence of cholera in Hodeida, Arabia, and Aleppo, Syria, at the close of last year's report.

The relations, however, of this outbreak in Syria to the recrudescence this summer of the epidemic in Persia are slight, if, indeed, any intimate connection whatever exists. There is no evidence that the disease spread from Syria either northward or westward; on the contrary, all the evidence goes to prove that Asiatic cholera reached European Russia by a route differing altogether from those followed during the last fifty years, though approaching the track selected by the earlier epidemics of this century before the opening of the Suez Canal. "This year's epidemic," says Dawson Williams, of Shadwell, England, ^{Sept. 17} "has once more followed a northern course, and has afforded one more striking illustration of the readiness with which Asiatic cholera can be conveyed along a trade route. Speaking broadly, Asiatic cholera has followed three main routes from India to Western Europe: 1. It has passed through the Northwest Provinces of India into Afghanistan, and thence along the caravan routes, by way of Balkh, Bokhara, and Khiva, to Orenburg, in Russia (1829, 1843-1844). 2. It has spread from Southern India up the Gulf to Persia, and radiated southwestward to Syria and Egypt, and northwestward across Persia to the Caspian Sea, thence to Astrakhan on its western shore, and from that port up the Volga to Saratov and Kasan (1830). 3. It has been transported, mainly in relation with the pilgrim traffic, to Red Sea ports, has gained Egypt, and spread thence to

the Mediterranean basin. Since 1865 the epidemic has always, until this year, taken the last-mentioned route, and the attention of international conferences has been, in the main, confined to devising precautions for protecting Europe from invasion by way of the Red Sea and Egypt."

The fact that cholera is always endemic in India makes it difficult to assign a specific origin to this year's epidemic, but by an examination of its progress we will see that it started from Djellabad, a city in Afghanistan, situated between Peshawar and Kabul, about the month of December, 1891; that it slowly traversed the mountainous territory separating Kabul from Herat, which latter place it reached in March, 1892; that it gained Meched in the Khorassan about May 27th, from four to five months after leaving Djellabad, but from Meched it reached the Transcaspian Railway about June 20th, appearing at the stations of Askalabad and Ouzorm-Ada on the Caspian Sea. It was, therefore, six months and more in traveling from Afghanistan to the Caspian Sea; but there it encountered other railways and routes of navigation and traveled to St. Petersburg, in northern Russia, and Hamburg, in northwestern Germany, in less than two months. The rapidity of its progress was, therefore, quadrupled during the second stage of its line of travel.

This epidemic has been, on the average, throughout its entire route, one of the most virulent of recent years. Tabulations of its mortality will follow at the close of this article. From information furnished the Marine-Hospital Service,¹⁴⁶_{Oct. 14} the following "official" figures of the mortality from cholera in Russia from June 18 (date of the outbreak in Baku) to September 1 (furnished by the United States consul) show that 144,090 deaths occurred in European Russia, of which the Caucasus furnished more than one-third, viz.:—

	Deaths.		Deaths.
The Caucasus in general, . . .	53,159	St. Petersburg, town, . . .	604
District of the Don, . . .	14,592	Riazan government, . . .	335
Saratoff government, . . .	10,297	Yaroslavl government, . . .	292
Samara government, . . .	9,728	Ekaterinoslav government, . . .	291
Transcaspia, . . .	9,465	Moscow government, . . .	204
Astrakhan government, . . .	7,541	Poltava government, . . .	193
Tobolsk government, . . .	7,358	Orel government, . . .	168
Voronej government, . . .	4,726	St. Petersburg government, . . .	118
Simbirsk government, . . .	3,702	Vladimir government, . . .	100
Viatka government, . . .	2,885	Lyublin government, . . .	91
Tamboff government, . . .	2,413	Tawris government, . . .	94

	Deaths.		Deaths.
Orenburg government,	2,391	Toola government,	80
Kazan government,	1,854	Kostroma government,	82
Ouralsk district,	1,744	Kherson government,	46
Tomsk government,	1,559	Chernigoff government,	28
Nijni Novgorod government,	1,340	Kief government,	16
Different points in Siberia,	1,198	Tver government,	8
Oufa government,	940	Novgorod government,	1
Penza government,	919	Kharkoff government,	2,057
Kursk government,	796		
Perm government,	675	Total,	144,090

The *Charkow Government Gazette* ¹⁴⁶_{Nov.4} estimates the total number of choleraic deaths throughout the Russian Empire to September 13th at 172,363. No reliable statistics can be given of the mortality in Persia, Arabia, and Afghanistan, as the reports from the villages of the different provinces in these countries are not only unofficial, but, from the variety of sources, conflicting. In many instances it is stated that small settlements were entirely depopulated. An outbreak of Asiatic cholera in Budapest, Hungary, was officially announced ¹⁴⁶_{Nov.11} on September 29th by the Sanitary Council, two hundred and sixty-seven cases with one hundred and twelve deaths being reported. The authorities believe that the disease was introduced by the importation of hides from infected districts. In Germany the disease appeared in many small places in isolated groups, usually traceable to fugitives from Hamburg. The same may be said of France, Belgium, the Netherlands, and Great Britain, although in Paris, Havre, Marseilles, Antwerp, and Rotterdam the disease assumed nearly epidemic features for a time in September and October.

In Western Europe the epidemic spent the most of its force on the city of Hamburg. This sea-port is the great centre for the embarkation of Russian emigrants for America, and the introduction of the disease can be undoubtedly traced to that source, although it has been said, unofficially, that it was brought to Hamburg by an East Indian merchantman. The Hamburg Senate, on August 24th, admitted the existence of Asiatic cholera in the city, ¹⁴⁶_{Aug.26} there having been, up to that date, 291 cases and 75 deaths. On the 16th of November the Senate declared the epidemic ended. In round numbers, about 21,000 persons were attacked and over 11,000 died during its three months' existence. It reached its high-water mark, according to the revised returns of the Hamburg Senate, on August 30th, when there were 1086

new cases and 484 deaths, in an estimated population of 570,000. In the last sixty years Hamburg has had fourteen cholera epidemics. The last one prior to the present occurred in 1873, with 1729 cases and 1005 deaths, representing a mortality of 58.1 per cent. The United States government, as represented by the Marine-Hospital Service, which by law has particular charge of the quarantine resources, began to take early measures to prevent the introduction of cholera within its territory. On July 8th it was ordered that vessels from cholera-infected districts should be forbidden entry unless provided with certificates of disinfection, according to prescribed rules. On August 17th it was ordered, in view of the progress of the disease in Russia and the emigration therefrom to the United States, that the personal effects and baggage of immigrants and others from the cholera districts should be disinfected at the port of departure. On August 19th it was ordered that on and after September 20th rags from any foreign port should be refused entry unless properly disinfected, as certified by consuls to that effect. All rags from cholera districts were prohibited entry under any condition. On August 24th, as soon as cholera was declared epidemic in Hamburg, a subsequent amendatory order was issued decreeing that the previous order, which did not become operative till September 20th, should take effect at once. On August 31st the steamship *Moravia* arrived at New York, fourteen days out, and reported 22 deaths on the passage, which were admitted to be true Asiatic cholera. This direct menace from emigration caused the President to respond to a general public demand for the prohibition of emigration. This being beyond his powers, he exercised his authority indirectly in approving an order issued by the Surgeon-General of the Marine-Hospital Service, dated September 1st, which required that all vessels bringing immigrants from any source should undergo a quarantine detention of twenty days, or longer, if necessary, before entry. Vessels afloat at date of order were to be made subjects of special action. This circular, not intended as a quarantine measure, had its desired effect indirectly in placing a practical embargo on immigration, and this order remains still in effect. To enforce this, the national and local quarantines were strengthened, and sanitary inspectors were stationed at every railroad and steamboat crossing on the Canadian border, to guard against the

introduction of cholera from that source. Canada joined in a similar restrictive order,^{146 Sept. 30} thus completing a sanitary cordon along the entire Atlantic border. On September 3d the steamship *Normannia* and the steamship *Rugia*, both from Hamburg, arrived at New York, the former having had 5 and the latter 3 deaths from cholera during the passage. A few deaths from cholera occurred in New York City after that date.

Scarlet Fever in London.—Out of 3700 patients under treatment in the metropolitan hospitals in September, 1892, 3300 were suffering from scarlet fever.^{6 Sept. 16} This disease has also been more or less epidemic^{146 Vol. 7} during the past year in Warsaw, Stockholm, and Milan.

Small-Pox.—An epidemic of this disease prevailed in Victoria, British Columbia,^{146 July 29} during the summer. There were about fifty-five cases and eleven deaths reported. Small-pox was also reported as epidemic in Egypt.^{146 Oct. 14} (For statistics, see pages 42-44.)

Yellow Fever.—This was reported^{146 Aug 5} as epidemic at Vera Cruz, Mexico, with a large mortality. (For statistics, see page 41.)

STATISTICS.

The following statistics of the cholera epidemic of 1892 (January 1st to November 30th), in the United States, are from the records of the United States Marine-Hospital Bureau:—

New York City.—Ten cases and 8 deaths in September.

New York Bay.—One death in August, 43 deaths in September. There were 72 cases of cholera and 56 “suspects” transferred to Swinburne Island from vessels in port, namely, *Moravia*, *Normannia*, *Rugia*, *Wyoming*, *Scandia*, *Heligoland*, and *Bohemia*; all hailing from Hamburg, excepting the *Wyoming*, from Liverpool. There were 76 deaths from cholera at sea on the above-named vessels.

New Brunswick, N. J.—One death in September; disease supposed to have been contracted in New York Harbor.

Grainwick, N. Y. (a suburb of North Tonawanda).—Five suspected cases and 2 deaths during October.

The following statistics of the cholera epidemic of 1892 (January 1st to November 30th), in foreign countries, are taken from consular and other official reports transmitted to the United States Marine-Hospital Bureau:—

Russia.—The cholera epidemic of 1892 appeared in Russia at Baku, a port on the Caspian Sea, in the latter part of June. The disease is still present in many localities, chiefly in Russian Poland. The total number of deaths from cholera throughout the empire is estimated at 300,000.

German Empire.—Cholera was officially admitted present in Hamburg August 18th. The total number of cases in all parts of Germany, reported up to November 17th, is 19,647; deaths, 8575. Of these, 17,975 cases and 7611 deaths occurred in Hamburg. Several cases were reported from Hamburg in December.

Austria-Hungary—Budapest.—The first case of cholera was officially declared October 5th. Up to October 31st, 874 cases and 375 deaths were reported. During the months of November and December cases and deaths occurred, but not in considerable numbers. About 142 cases were reported from various localities in Hungary and Galicia. The course of the epidemic was mainly along the Danube and Theiss, and on the Russian frontier. When not directly imported, the disease has been generally found to be due to the use of contaminated drinking-water.

Netherlands.—Cholera appeared in the sea-port towns of Holland, about the beginning of September, and was disseminated along the line of canal traffic. The principal focus of the disease was Utrecht. About 132 deaths have been reported. The disease was considered nearly extinct by the middle of December.

Belgium.—Up to November 15th, 798 cases and 400 deaths were reported in the city and province of Antwerp. The epidemic was reported present in thirty other localities, with 540 cases and 302 deaths. The maximum intensity was reached on September 26th, with 32 cases in twenty-four hours; maximum mortality, 13. Isolated cases are still reported. The disease was imported from Havre, and appeared about August 18th.

France.—The epidemic showed itself chiefly at towns and villages along the Loire and Seine, and on the northern sea-coast. At Calais, Dunkirk, Boulogne, Etaples, etc., cases still occur. The total number of choleraic deaths officially reported is 3184. Of these, 1694 occurred in Paris and its environs. A focus of the epidemic also formed at Marseilles.

Persia.—An approximate estimate of choleraic deaths, from May 1st to October 31st, is about 80,000. The epidemic is by no means extinct. At present the provinces and ports along the Caspian Sea are most affected.

Caucasus.—The eight or nine governments of the Caucasus have lost about 80,000 inhabitants from the cholera epidemic. This number is nearly 3 per cent. of the population.

Turkey in Asia.—Calculation on reports received gives 3000 choleraic deaths.

India.—From the Hissar district, 3500 choleraic deaths are reported; from Lahore, 2000. The disease is present in Calcutta.

Afghanistan.—From Kabul, 5575 deaths from cholera are reported; from Herat, 2000.

The total number of cases of cholera, and deaths therefrom, in foreign countries, are tabulated as follows:—

COUNTRIES.	TOTALS.	
	Cases.	Deaths.
Russia . . . . .	.....	300,000
Germany	19,647	8,575
Austria-Hungary	874	375
Galicia	142	
Netherlands	132	
Belgium	1,338	940
France . . . . .	.....	3,184
Persia . . . . .	.....	80,000
Caucasus . . . . .	.....	80,000
India . . . . .	.....	5,500
Afghanistan . . . . .	.....	7,575
Turkey in Asia . . . . .	.....	3,000

These statistics are only approximately accurate, full reports of the epidemic not having yet been received. The most recent information shows the disease to exist in an epidemic form in many localities in the East, and that in some European sea-ports isolated cases still occur.

YELLOW FEVER IN 1892 (JANUARY 1ST TO NOVEMBER 30TH).

(As reported to the United States Marine-Hospital Service.)

COUNTRIES AND CITIES WHERE PRESENT.	DEATHS.										
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.
UNITED STATES :											
(a) Gulf Quarantine											
(b) Key West Quarantine							1				
New York		1									
Mullet Key								1			
Vineyard Haven								1			
FOREIGN :											
<i>Brazil.</i>											
(c) Bahia	2	5						3			
Ceara	20	15	20	7	31	14	8		14	11	5
Pernambuco				2		1	1			1	
(d) Rio de Janeiro	449										
Santos	389	206	50	77	8						
<i>Costa Rica.</i>											
Punta Arenas	1			1							
<i>Cuba.</i>											
Cienfuegos	3	3	1					1	1	1	1
Havana	15	10	1	1	7	10	28	69	75	53	53
Santiago de Cuba			2	1							
<i>Ecuador.</i>											
Guayaquil	78	50	5								
<i>Guiana.</i>											
Paramaribo						2	1				
<i>Jamaica</i>		1									
<i>Japan.</i>											
Kanagawa	76										
<i>Mexico.</i>											
Tuxpan									2	2	
Vera Cruz				9	14	20	58	46	15	12	

(a) Four cases on British steamship *May* on arrival from Vera Cruz in September.
 (b) Seven cases in August; all recovered. (c) Report, dated February 6, 1892, gives 6 cases and 1 death since January 1st. (d) There were 692 deaths reported during the four weeks ended March 19, 1892.

SMALL-POX IN 1892 (JANUARY 1ST TO NOVEMBER 30TH).

(As reported to the United States Marine-Hospital Service.)

COUNTRIES AND CITIES WHERE PRESENT.	DEATHS.										
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.
UNITED STATES :											
<i>California.</i> . . . . .	..	..	..	..	..	..	..	..	1		
San Francisco Quarantine . . . . .	..	..	..	1							
<i>Connecticut.</i> . . . . .	..	..	..	..	..	..	..	..	..	..	4
New Haven . . . . .	..	..	..	..	..	..	..	..	..	..	2
<i>Florida.</i>											
Tampa . . . . .	..	..	..	..	..	..	..	1			
<i>Illinois.</i>											
Chicago . . . . .	..	..	..	..	1	1	1				
<i>Massachusetts.</i>											
Salem	1										
<i>New Jersey.</i>											
Newark	1	..	1								
<i>New York</i>	2	7	3	11	13	10	8	18	9	27	18
Brooklyn . . . . .	..	..	..	..	..	1	..	..	1	2	..
New York . . . . .	..	6	2	9	5	8	7	8	2	6	9
<i>Ohio (a).</i>											
<i>Pennsylvania.</i>											
Condersport . . . . .	..	..	..	..	..	..	1	..	..	1	
Pittsburgh . . . . .	..	..	..	1	..	..	..	..	..	..
<i>Rhode Island.</i>											
Providence . . . . .	..	1	..	2							
FOREIGN :											
<i>Austria.</i>											
Vienna	3	9	2	1							
<i>Belgium.</i>											
Antwerp . . . . .	..	..	1	..	3	4	3	6	5	3	12
Brussels	1	1	3	..	..	..	..	3	2	..	1
Ghent	1	7	8	21	8	6	1	..	..	..
<i>Brazil.</i>											
Pernambuco . . . . .	..	..	..	1	1	1	1	1	1		
(b) Rio de Janeiro	7										
Rio Grande de Sul . . . . .	..	..	3	7	14	11	40	9			
Santos	26	39	..	32							

(a) Twenty-seven cases reported June 6, 1892. Epidemic over August 5, 1892. (b) Eight deaths during four weeks ended March 19, 1892.

SMALL-POX IN 1892 (JANUARY 1ST TO NOVEMBER 30TH) — *Continued.*

COUNTRIES AND CITIES WHERE PRESENT.	DEATHS.										
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.
<i>British Columbia.</i>											
(c) Victoria											
<i>Canada.</i>											
(d) Quebec	32										
<i>Ceylon (e).</i>											
<i>Chili.</i>											
Talcahuano			17								
<i>China.</i>											
Hong Kong		1	2	5		13	2		1		
<i>Egypt</i>											
Alexandria	2	3	15	20	4	4	6		1		
Cairo		3	12	6	7	8	6	4	2		
<i>England.</i>											
Liverpool	3	2	2	1	9	2				1	
London	1		4	7	6	9	10				1
Newcastle-on-Tyne						1					
<i>France.</i>											
Havre	1	1		3							
Marseilles	9	11	13	10	2	2	1				1
Nantes								5	1		
Nice		1	3	2							
Paris	1	2	4	4	2	2	4	5		5	5
Rheims	5	2	5	2	1	2	1	1			
Rouen				2							
<i>Germany.</i>											
Frankfort-am-Main							1				
Munich				2							
Prague	13	1	5	10	6	39	9	3	3	7	6
<i>Gibraltar</i>										1	
<i>India.</i>											
Calcutta	1		2	2	4	1					
Singapore	2	6		2		3	1				
<i>Italy.</i>											
Genoa	9	8	14	5	7	3	4	7	7	12	8
Milan			1		1	1		2			
Rome				1							
Venice									1	1	

(c) Epidemic reported July 10, 1892; 71 cases and 13 deaths to August 6, 1892. (d) Epidemic broke out in June, 1891, and continued until February, 1892. There were 151 cases and 32 deaths reported during the epidemic. (e) Twenty-three deaths during three months ended March 31, 1892.

SMALL-POX IN 1892 (JANUARY 1ST TO NOVEMBER 30TH).—*Concluded.*

COUNTRIES AND CITIES WHERE PRESENT.	DEATHS.										
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.
<i>Japan.</i>											
Hiogo			1			1	1		8	7	10
Kanagawa	76	79	13								
<i>Malta and Gozo</i>	12										
<i>Mexico.</i>											
Vera Cruz	2										
<i>Netherlands</i>						1					
Rotterdam					1		1				
<i>Russia.</i>											
Odessa	1	1	1		1	6	6	3	3	8	11
Riga	1	1		3	1		4	10	12		
Warsaw	13	13	25	30	13	16	25	29	39	56	52
<i>Scotland.</i>											
Glasgow											6
<i>Spain.</i>											
Barcelona	14	26	32	17							
Cadiz	11	5	5	3	1		3	1			
Denia						1					
Jerez de la Frontera	1										1
<i>Sweden.</i>											
Gothenburg				1							
<i>Switzerland.</i>											
Lucerne					3						
Zurich					1	1	1				
<i>Turkey.</i>											
Constantinople					16	9	6	9	2		

ANOMALIES AND MONSTROSITIES.

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ANOMALIES.

Head and Thorax.—An interesting paper comes from the pen of Bland Sutton,⁶_{Nov. 28, '91} on certain small tubercles which are occasionally observed about midway between the angle of the mouth and the ear, and which he traces to imperfect closure of the embryonic mandibular fissure. Dimples, so highly prized by young ladies, he traces to the same cause. A curious congenital tumor is reported by Graham,¹⁹⁹_{Feb.} arising from the junction of the hard and soft palate, and attached by a pedicle about an inch in diameter. It extended out of the mouth and lay upon the child's chest, being nearly as large as the infant's head. The child died an hour after the removal of the tumor. The growth was found to be a vascular mass, containing several cysts and some fatty matter, and in the central part a bone resembling the sphenoid. Edmondson³⁶_{July} describes a fœtus, one of full-term twins, with numerous grave defects, the other twin being normally formed. The cranial vault was defective. The nose was flattened and imperforate; the ears were represented merely by small apertures, there being no external ear; and the eyelids of the left eye were imperfect. Its limbs were also greatly deformed. The most peculiar anomaly, however, was a deep constriction a little below the umbilicus, dividing the fœtus into two nearly equal parts. The circumference of the body at the constriction was but twelve centimetres, against thirty-two centimetres at the shoulder. M. Greig²⁷⁷_{Jan.} reports a case of congenital and symmetrical perforation of the parietal bones in an adult male. Each perforation was about three centimetres in diameter. A case of cephalhæmatoma is presented by D. T. Smith.²²⁴_{Apr.} Guillemet¹²⁷_{Mar. 12} read a note on a rare

case of malformation of the pharynx. An anomaly of the hypoglossal nerve is reported by Buffet-Delmas.³
Mar. 23

Hutchinson⁸⁰⁶_{Apr.} details a case of the rare anomaly gynæcomajia in a boy of 15, whose breasts were as large as those of a well-developed young woman, and whose manner was singularly feminine and retiring. His external genitals were extremely small. He was fat to obesity, and of feeble intellect. J. S. Skeels¹⁹⁹_{Feb.} mentions a woman whose left breast had two nipples, the extra one two and one-half inches below the other, and from either of which the baby could nurse. Sangre reports the only case of supernumerary breasts this year. In his case the breasts were both rudimentary, were situated just below the normal glands, and made their presence known only by a certain amount of pain and sensitiveness during the latter weeks of pregnancy. Lee and White²⁷⁷ showed a body containing an accessory digastric nerve. Thompson⁶_{Aug. 6} reports the case of a child of 14 days old, from whose congested breasts considerable milk oozed. David Hepburn¹⁶⁵ reports an interesting case of a large defect in the capsule of the shoulder-joint. Herzfeld²²_{June 1} showed an infant with a deep depression in the left side, marking a developmental defect in the costal cartilages. A case of defective endochondral ossification in the human foetus, belonging to the so-called cretinoid type, is elaborately treated by Symington and Thomson.²¹⁷⁰_{v. 18} The foetus was delivered at full term. It was chiefly noticeable on account of the shortness of its limbs, their thickness, and the deep transverse sulci across them. Further investigation showed this to be due to arrest of endochondral ossification. An exhaustive microscopical study was made, but without any definite conclusions as to cause. The appearances resembled what is known as sporadic cretinism in the premature arrest of endochondral ossification, and in an abnormal condition of the thyroid gland, consisting of proliferation and desquamation of the alveolar epithelium, together with great fullness of the blood-vessels.

At a meeting of the Berlin Medical Society, Aron²²_{July 13} showed two preparations and two females possessed of cervical ribs. One of the preparations was from a case in which abnormality was detected during life, although the bony resistance in the supra-clavicular region rendered the diagnosis very difficult. The rib was found, on section, after the death of the patient from phthisis, to

be five and one-fourth centimetres in length. Both females, one of 7 and the other a girl of 13, showed a slight bony swelling in the supra-clavicular fossa. The speaker remarked that such clavicular ribs, by their pressure on nerves and vessels, sometimes demanded resection.

Princeteau⁹⁹⁶_{July 25} contributes a careful paper on certain anomalies occurring in the muscles, nerves, and blood-vessels of the same subject; and an account is also given⁹⁹⁶_{July 25} of muscular anomalies in two hundred and eight subjects. Ramadier and Sérieux²¹²_{May 10} contribute a paper on a malformation of the thorax.

Heart and Arteries.—F. C. Abbott²_{Apr. 2} showed two specimens of abnormal aorta, one a right arch, the branches arising in the following order: Left carotid, right carotid, right vertebral, right subclavian, left subclavian. The second, a left arch with the carotids arising by a common trunk, the right vertebral arising from the right carotid beyond the carotid trunk, the left vertebral, then the left subclavian, and, lastly, the right subclavian. He also showed a pulmonary valve with four cusps. Howden exhibited a heart with developmental anomalies.

Norman Moore¹_{June 11} showed the heart of a boy aged 5 months. The foramen ovale was widely open, and the right auricle double the natural size and thickness. An opening which barely admitted an ordinary pin represented the tricuspid valve, and led into a right ventricle just capable of holding two pins' heads. The ductus arteriosus was patent. Circulation was consequently carried on by a single ventricle, and the blood-current must always have been mixed. During life the child had been deeply cyanosed.

Albert Martin⁵⁵⁷_{July} details a case, in a healthy boy of 12 years, of what he considers to be patent ductus arteriosus. There is increased cardiac dullness, a bruit heard with more or less clearness over the whole anterior and posterior portion of the chest. In addition, the same sound is heard along the whole course of the thoracic and abdominal aortas, in the femorals, and, during systole, at the vertex of the skull. The ophthalmoscope shows venous pulsation; the veins also have a beaded appearance. Two instances of anomaly in the origin of the coronary artery are related by Coleman.¹⁵¹_{Aug.} In one it was located one-half inch and in the other one-fourth inch above the free margin of the semilunar valve, when pressed back against the vessel-walls. James Mus-

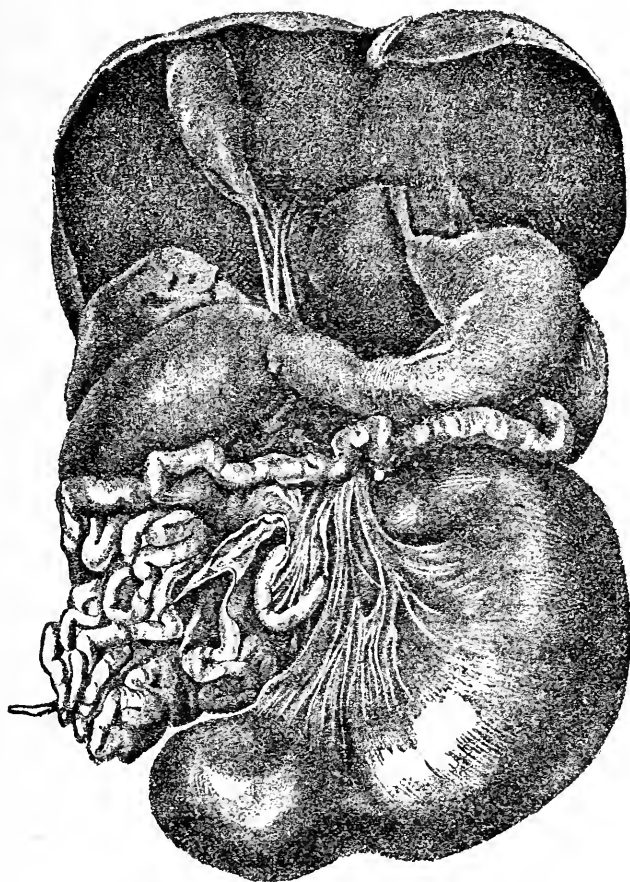
grove²⁷⁷_{Jan.} details an instance of bifurcation of the left femoral artery, with subsequent reunion. McAdoo⁶_{May 7} contributes a paper on anomalies of the aorta.

Gastro-Intestinal Tract.—Cleaver²_{Apr. 9} showed a specimen of imperforate œsophagus from a child who died at the age of 6 days. The œsophagus ended in a *cul-de-sac* at the level of the bifurcation of the trachea.

A specimen of intestinal abnormality was presented by W. J. Greig,³⁹_{Feb. 16} taken from the body of a child which had lived 4 days. There was practically no small intestine. Extending downward from the stomach were about two feet of healthy bowel, and upward from the rectum there was some three feet of fibrous cord the size of a lead-pencil, and pervious. Two inches from the upper end it dilated, contained fecal matter, and terminated in a point. There was no connection between the two sections of bowel. T. B. Grimsdale¹⁸⁷_{Jan.} tells of a woman whose children, four in number, died each on the third day. The fifth child, which was the only one he had seen, died on the fourth day, after obscure symptoms, of intestinal obstruction,—symptoms so similar to those of the other children that the parents confidently predicted the death of this child on the third day, though, at first, it was apparently healthy. An autopsy disclosed an occlusion of the gut two inches below the pylorus. The query is, Did all the others die of the same cause? He also reports a case of imperforate œsophagus, unsuccessfully operated on. A. H. Dodd⁶_{June 11} reports a case of congenital contraction of the ascending and transverse colon. The child lived six weeks. At the autopsy these two portions of the colon were found to be but little larger than a lead-pencil.

Edward Zielinski, of Warsaw,⁶⁷³_{Jan.} read a paper on the sinking of the colon transversum. Out of 127 cases, confirmed by post-mortem examinations, he found in 37 elongation of the lobi dextri of the liver; in 13 cases the so-called “corset liver”; in 14 cases erosions of the mucous membrane of the stomach; in 10 cases round ulcers of the stomach and duodenum, and, finally, a floating kidney. The author criticises all former theories, explaining all the above pathological states, and considers them as arising from the sinking of the colon transversum. (Report of J. Drzewiecki, corresponding editor, Warsaw, Poland.) James Adams²_{Apr. 9} showed a specimen of ilco-colic intussusception, the cause of death in a man

of 42 years. Examination revealed the fact that the intussusception had arisen from an inverted Meckel's diverticulum, which was situated eight inches from the ileo-caecal valve and was three inches in length. Clarkson and Collard²⁷⁷_{Apr.} observed a diverticulum resembling Meckel's, connected with the jejunum and situated two feet



CONGENITAL OBLITERATION OF THE SMALL INTESTINE.
(*Edinburgh Medical Journal.*)

from the pylorus. Its lumen was equal to that of the gut. A specimen of Meckel's diverticulum was exhibited by Shepherd.²⁸²_{Mar.} W. B. Cheadle²_{Apr. 2} showed a boy of 16 years with transposition of the viscera. Tiraud⁶_{May 21} reports a case of abnormal arrangement of the intestines, and also one of cystic disease of the ovaries in an infant.

John Thompson³⁶_{Dec., '91} in a most elaborate and careful article on congenital obliteration of the bile-ducts, gives an exhaustive history of a case that came under his own observation, of a child which died at the age of 3 months. It had been constantly jaundiced from after the tenth day of birth. Its stools had always been clay-colored, and its urine stained with bile. Ballantyne³⁶_{Jan.} described the case of a New Zealand woman who had given birth to five infants in succession, in all of whom there was an impervious condition of these ducts.

Arthur Mason⁶_{Nov. 21, '91} delivered a child marked by absence of the abdominal walls over a space of two inches in diameter, imperforate anus, and a bulging swelling between the widely-separated labia majora. The feces passed by means of a small slit at the base of this swelling. At the age of 6 weeks the abdominal opening closed by means of healthy granulations. The child died, of an attack of diarrhœa, at the age of 2 months. The necropsy disclosed a bifurcation of the bowel at the sigmoid flexure. One of these portions ended in the slit-like opening just mentioned, whilst the other ended in a blind pouch. In addition, there were several other abnormalities. H. C. Pauli²_{Jan. 2} reports a case of ectopia viscerum. A case is recorded by T. Eliot,²⁰⁵¹_{v. 14} in which the stomach, small intestines, colon, bladder, and both testicles protruded through an opening in the bladder, about two inches in length, below the umbilicus. The child lived one day. J. Hawkins¹⁰⁵_{Mar. 1} mentions a case accompanied by sympodia.

J. F. Pratt¹⁷⁶_{Aug.} records a curious anomaly. The transverse colon emerged from the right hypochondriac region, crossed the abdomen externally to the left hypochondriac region, where it entered the abdominal cavity. Just above the pubic arch the rectum emerged, extended about two inches, and ended in a circular opening. There was no anus. In either groin was a scrotum and penis, but through the right only was urine passed. The child died in six days, of inanition. No autopsy could be obtained.

Windle¹⁶⁵_{Apr.} contributes a paper on "Identical Malformations in Twins." The description of one, he says, will apply also to the other. There was ectopia viscerum. A cyst the size of a walnut sprung from the posterior part of the vertebral column, and extended to about the centre of the sacrum. With the exception

of a small fold of skin on the inner aspect of either thigh (probably rudimentary labia majora) there was no sign of external genitals, save that in the middle line was a minute orifice, which, on dissection, led to a small sac,—either a bladder or a cloaca. There was no anus. The sacral sac was found to be lined with epithelium, and connected with the theca of the spinal cord by an opening in its anterior wall. It was probably persistence of the neurenteric canal.

W. Cheyne ²_{Apr.16} showed a 3-week-old infant with an umbilical faecal fistula. Ballantyne ³⁶_{July} reports a case of umbilical hernia in a foetus. Examination showed that the hernia contained the liver. Taylor ²_{Nov.28,'91} showed a male patient of 13 years, with transposition of the viscera. Wright ⁶_{Dec.19,'91} tells of a married woman, aged 25 years, mother of three children, who, after dying of sapræmia, the result of burns, was found to have an imperforate anus, both rectum and urethra opening into the vagina. J. W. Funck ¹⁰⁴_{May 7} had a case of imperforate anus and absence of rectum. The parents declined operation, and the child died on the third day. Himmel-farb ⁹⁵_{B.42,H.2} records the case of a Russian girl of 14 years, in whom the anus opened between the frænum and the hymen. Defecation was voluntary. Uterus infantile. A. J. Wood ²⁸⁵_{Mar. 2} performed Littre's operation on a child 1 day old, with imperforate rectum and vagina. The child died two days afterward.

Recent investigations on the significance of what is commonly known as the "post-anal dimple," ⁶_{May 7} as well as of the cyst or sinus that is occasionally found in the same location, throw new light on some disputed points. These cysts are found to be lined with epithelium. The researches referred to show that, during foetal life, there extend from the spinal canal epithelial-lined tubes, which become smaller and more fragmentary in the later stages of development. It seems, therefore, that the lower end of the medullary canal is gradually obliterated as the foetus develops, and that this obliteration is oftenest incomplete at the lower extremity. A. Ritschl ¹³_{Apr.15} tells of a congenital tumor in the sacral region, which he extirpated. A. T. Perkins ⁸⁵_{Feb.} mentions an abdominal cyst in a foetus, which delayed delivery, and from which over a gallon (4 litres) of straw-colored fluid escaped.

Rogie and Perignan ²²⁰_{Feb.26} furnish an elaborate and exhaustive paper on an anomaly in the evolution of the peritoneum, namely,

persistence of the meso-duodenum and the primitive common mesentery in a seventh month fœtus.

Genito-Urinary Organs.—Jacob ²_{May 28} reports a healthy girl of 18 years of age, in whom careful examination failed to find any trace of a uterus. What appeared to be a double inguinal hernia was probably an ovary on each side. The external genitals were normal, with the exception that there was no pudendal hair. Campbell ²_{Apr. 2} narrated the case of a girl of 14 years, who complained of considerable abdominal pain and swelling, who had never menstruated, and in whom no vaginal opening could be found. An artificial vagina was made, and a dark, treacly fluid evacuated. Ramdor related a somewhat similar case, and Wallace two cases of imperforate hymen in sisters. Akontz ³¹⁷_{No. 25} recently examined a woman of 23 years, married at 16, who suffered from periodical hypogastric pains, but who had never menstruated. A hymen with many small foramina was found, behind which was a stout, horizontal band, supposedly the remnant of the uterus. There was no vagina, but the elastic hymen would yield to pressure so as to admit the finger some two inches, this condition being probably due to repeated attempts at coition.

A. Vander Veer ²⁵⁷_{July} reports a case of absence of vagina and uterus, with the usual unsuccessful attempt at making an artificial vagina; one case of absence of uterus and ovary, the distressing periodical abdominal pains being relieved by abdominal section and removal of the ovaries; and a third case of imperforate hymen with great abdominal distension, due to retained menses. In the latter instance, also, operation resulted in perfect cure. A. Sylvestre ⁸⁷_{Aug. 31} describes a case of double vagina, and another of absence of vagina. Brettauer ¹⁵⁰_{Mar.} also mentions a case of double vagina. Lott ²²_{Dec. 9, '91} showed a young woman with two narrow openings entering the uterus, an instance of the persistence of the Müllerian ducts. Mangiagalli ³⁶_{Sept.} reports three interesting cases of uterus unicornis, with rudimentary horn, in one of which the rudimentary horn became the seat of conception, in another of fibroid growth, and in the third of inflammation.

Buchanan ²¹³_{July} showed a uterus bicornis. The cause of the non-union of the Müllerian ducts in this case was probably a stout band of connective tissue stretching from rectum to bladder. Another instance of uterus bicornis is recorded by F. Berlin. ²³_{Jan.}

G. W. Hudspeth⁵⁰⁶_{May 15} reports an interesting case of complete and perfect double uterus and vagina. At the time of examination the right uterus was gravid, whilst the left was empty. Seven months afterward she was safely delivered of a healthy child. Halter¹¹³_{No. 2} gives a complete history, with results of an operation, of a case of uterus didelphys, hæmatokolpos unilateralis, hæmatometra, and hæmato-salpinx dextra. Mills²⁸²_{Jan.} exhibited a tumor the size of a turkey's egg, which he had removed from the oviduct of a hen. Falc³¹⁷_{No. 44, '91} reports that an operation performed with the intention of removing what was supposed to be an ovarian tumor disclosed the growth to be a cystic dilatation of a supernumerary tube, to which was attached the remnant of a supernumerary ovary degenerated from pressure. Haultain³⁶_{May} showed two specimens of developmental anomalies of the Fallopian tubes. One was marked by an absence of the abdominal opening, together with a noticeably smooth mucosa; the other exhibited two cavities instead of one.

R. Abel²⁶_{Mar.} describes a patient of 33 years, presenting an elastic abdominal tumor the size of a human head. As there was atresia of vagina, a diagnosis of hæmatometra was reached and an attempt was made to empty the tumor through the vagina, but the patient succumbed to sepsis. The autopsy disclosed a condition of pseudo-hermaphroditism. In the right inguinal canal a body was found, the size of a plum, which proved to be a testicle. The large tumor was decided to be the sarcomatous left testicle. There were no ducts leading from the testicles. The vagina was 4.8 centimetres long. The menses, which the patient had claimed, the author considers to have arisen from a urethral polypus the size of a bean. Ralph Worrall²⁶⁷_{Jan.} describes an individual of 21 years, who passed for a girl, but who, upon examination, was found to be of the opposite sex. No ovary, prostate, testicles, or uterus could be found, though the testicles are probably present. An imperforate penis two and one-half inches long exists, beneath which is a vagina-like opening, guarded by two lips resembling labia majora, through which urination takes place. Baekel⁶_{Apr. 30} reports an instance of hermaphroditism. A man (?) aged 20 applied for relief for an inguinal hernia. Instead of hernia, however, a mass was found and removed which consisted of (1) a bicornate uterus, the mucous membrane of which was lined by ciliated epithelium; (2) a Fallopian tube and a testicle provided with an epididymis and

a vas deferens; (3) a broad ligament inclosing these organs. This is the only known example of female sexual organs being contained in the scrotum of a man whose physical conformation would certainly not have given rise to a suspicion of any such mixture of the sexes.

C. M. Coe¹⁹⁹_{Oct.} says that a lady-like person of 21 years consulted him about a supposed hernia, which, on examination, he found to be a testicle. Further examination disclosed a condition of complete hypospadias, which, along with the bifurcated scrotum, rendered the genitals not unlike those of a female. The general appearances of the body—hips, breast, and the like—were those of a male, and the patient accordingly donned men's attire.

Räuber²⁶_{Aug.} describes a man of 38 years, in whom the testes were normal, but who was destitute of a penis, the urethra opening into the anterior wall of the rectum. Shepherd, of Montreal,²⁸²_{June} exhibited a kidney found in the left side of a female subject, which was supplied with six renal arteries. Two arteries came from the aorta, two from the common, and two from the internal iliac arteries. The right was supplied with three arteries. A. W. Hughes,²_{June 4} details an instance of abnormal arrangement of the arteries in the region of the kidneys and supra-renal capsules. Rotch⁹⁹_{May 26} reports a case of double movable kidney, which had been operated on with success. A. G. Wylie⁶¹_{Feb. 20} mentions a case of double right kidney, one of which lay beneath the right broad ligament. There was no left kidney. It was probably a case of floating kidney. An instance of horseshoe kidney is reported by D. G. Sharpe,¹⁹⁹_{Oct.} which was discovered at an autopsy. Frank Ferguson⁴⁶²_{Apr.} presented a specimen of horseshoe kidney and another of double ureter. G. Lemièrre²²⁰_{June 24} reports a case of single kidney found in the body of a man of 64 years. Another instance is reported by Auscher,⁷_{Apr. 15} found in the body of a male infant of eighteen months. M. J. Noel⁷_{May 13} found but a single kidney in the body of a woman of 62 years. M. Jossierand²¹¹_{Feb. 28} showed a case of ectopia of the kidney in a man of 62 years. Baum³¹⁷_{No. 17} relates an instance of two right ureters in a young woman. They were so closely situated that they gave rise to incontinence of urine, and an operation was successfully performed to close one of the ureters. Marsh²_{Dec. 5, '91} describes a case of exstrophy of the bladder, in a girl of 9 years, on which he operated with considerable success. Shep-

herd²⁸²_{Jan.} exhibited a dissecting-room specimen, a bladder from which protruded posteriorly a remarkable diverticulum, consisting of the mucous membrane and extending through the muscular coat. He knew nothing of the history of the case. D. L. Moore²²²_{Aug.} observed, in a female patient of 26 years, two meati urinarii,—one in the normal position, the other one-fourth of an inch above the first, in the median line. L. Fürst¹⁵⁸_{B.14,H.6} discusses at length the subject, and describes a case of epispadias along with a patent urachus, existing in a 10-week-old female infant. Dor²¹¹_{June 19} reports a case of pseudo-hermaphroditism, which was found to be cryptorchidism with hypospadias. A case of complete hypospadias is described by Faguet.¹³⁸_{Dec. 20, '91} Auffret²⁶_{June 1} observed, in a girl of 19 years, a urethral malformation which he could call by no other name than epispadias. She suffered from incontinence of urine. He found the meatus represented by a single slit; no canal, no clitoris, and the vulvæ rudimentary. He successfully operated for the incontinence by closing the slit above so as to make a meatus. W. R. Howard, of Texas,¹_{June 11} describes a precocious boy of $3\frac{1}{2}$ years, 3 feet 10 inches in height, and weighing 66 pounds (30 kilogrammes). He is developed like a man, with downy moustache, hair under the arms, about the nipples, over lower portion of the abdomen, and a heavy growth of hair on the pubes. The penis and testicles are those of an adult. The penis is $4\frac{1}{2}$ inches in length and the same in circumference during erection. He has a deep-bass voice, but his face, teeth, and mental development are those of a child. D. G. Sharpe¹⁸⁶_{July} delivered a woman of a child marked by imperforate anus and entire absence of external genital organs.

Extremities.—S. D. Swope⁹_{Jan. 16} notes a very singular case of synchronous movements of the upper extremities. A muscular farmer declared that all his life, whenever he attempted to do anything with one hand or arm, similar movements were made by the other. If he scratched his head with his right hand, his left would move as if in the act of scratching. In passing a dish at the table, he always takes hold of the table with the disengaged hand to prevent it from following the hand with which the dish is carried. When writing, his left hand imitates the movements of the other. Three of his eight children inherit his peculiarity. J. Hutchinson⁸⁰⁶_{Apr.} details two cases of congenital absence of the radius, with other deformities of the bones of the forearm and hand.

F. C. Abbott ²_{Apr.9} read a paper on nine cases of congenital dislocation of the radius, seven of which occurred in the same family. Warfield, of Baltimore, ⁷⁶⁴_{Apr.} mentions a case of congenital absence of the radius in a boy of 14 years. R. H. Sayre, of New York, ¹_{Nov.28,'91} presented a case of congenital malformation of elbows, wrists, and hands, with non-rotation of the humeri. An interesting case of congenital deformity of both arms is recorded by A. C. Stonely. ⁷⁶⁴_{Dec.,'91} Vergely ⁷⁰_{Feb.28} mentions a young woman marked by both polydactylism and syndactylism. Another instance of polydactylism (six fingers) is noted by Porak. ²⁴_{Feb.14} An extra little finger was observed by G. S. Mill. ²_{Sept.17} Out of the six children in this family, four present the same abnormality. An almost identical case is mentioned by H. Alezais. ⁹⁹⁶_{July 25} Wiedemann ³⁴_{Nov.10,'91} reports an instance of intra-uterine amputation of some of the fingers. Vitroc ¹⁸⁸_{Feb.21} notes an instance of congenital malformation of the fingers. Another is discussed by Layral. ²²⁸_{Feb.15} L. Fürst ¹⁵⁸_{B.14,H.6} reports a singular case of a filamentous attachment to the thumbs. Craig ²_{Apr.23} showed a male child, 18 months old, with but two fingers and a thumb on each hand, the fingers present being the middle and ring.

Moussous ⁷⁰_{May 22} reports a case of malformation of the left leg of an infant. John Thomson ³⁶_{Sept.} showed a little girl of a year and a half with unequal development of the lower limbs, due, probably, to simple hypertrophy of the right. A. S. Whittaker, ¹⁸⁶_{July} mentions a child whose knees flexed forward instead of backward. The child lived two hours. J. Ridlon ¹_{Feb.13} showed a boy of 19 years with entire absence of all the parts below the condyles of the femur. Railton ²_{May 7} exhibited a girl of 9 months in whom both patellæ were absent. J. D. Thomson, of Hankow, China, ²_{June 4} describes a Chinese lad of 19 years, well developed, with the exception of a symmetrical deformity of hands and feet. There remain in the hand the carpus, the three inner metacarpals, the ring and little fingers; the rest are wanting. The feet are cleft to the bases of the metatarsals. The inner division includes the great toe and its metatarsal; the outer division comprises the two outer metatarsals and a rudimentary little toe. J. Hutchinson, ⁸⁰⁶_{Apr.} observed adhesion of the second and middle toes as a hereditary malformation in three generations. P. J. Fagan ¹⁶_{Feb.} notes an irregular nerve-supply to the dorsum of the foot. E. M. Duval ⁷_{Mar.11} contributes a paper on anomalies of the arteries, nerves, and muscles of the

hand. Basch¹¹²_{Apr.} calls attention to an interesting case of the so-called flying membrane, observed in a child. Between the thigh and the leg was stretched a fold of skin which formed a triangle, with the knee as the apex, and the base of which measured three and one-half inches; height, three inches. After death, the membrane was found to be formed partly of muscles and partly of skin.

MONSTROSITIES.

Nanocephalus.—Virchow⁶⁴_{July} describes the case of a child of 12 years with the deformity known as nanocephalus. Its height was that of a child of 4 years, whilst its head was no larger than that of a newborn babe.

Acephalus.—B. C. Hirst¹¹²_{July} reports a case of acephalus monobrachius, and also one of hydrencephalocoele anterior. (See cut on page 14.) Another case of acephalus is given by E. A. Cherry.¹⁹⁹_{Sept.}

Exencephalus.—E. Bonnaire²³⁶_{Apr.} reports a case of exencephaly with complete spina bifida,—so complete, indeed, that in the cervical region the œsophagus appeared posteriorly between the divided vertebræ. A normal child was born at the same birth. S. R. Thompson¹³⁹_{May} mentions a case of encephalocoele that lived three days.

Anencephalus.—D. S. Booth⁶⁶³_{Dec., '91} delivered an anencephalous monster, with another fœtus of about two and a half months, the latter being enveloped in a cyst, which contained about a gallon (4 litres) of a sero-sanguinolent fluid. The first fœtus had probably reached some eight months. The mother sustained a severe fall when between two and three months pregnant, and this is supposed to have caused the death of one embryo. Gould Smith⁸²_{Apr. 9} mentions an anencephalic seventh month fœtus, which was also destitute of medulla and spinal cord. Alfonso Ortiz¹⁷⁹_{Feb. 1} reports a case complicated with hydramnios. There was also harelip, and incomplete development of the sexual organs. James Venables²⁸⁴_{Dec., '91} delivered a female fœtus, well-formed with exception of the head. The face had a depressed appearance, and the ears were not fully developed. The calvaria was entirely wanting. The skin covered a reddish, pulpy mass, having a slight resemblance to brains. The frontal bone was rudimentary. Clarke²_{Apr. 9} showed a monster of this character, which had also double genu recurvatum, talipes, and proptosis of one eye. M. M. Brown's¹⁸⁶_{July} case was marked, there

being, in addition to absence of parietal, frontal, and occipital bones, complete spina bifida. Other instances are reported by Showalter,¹²¹ Jan. Cassoute,⁴⁶ June 15 and Cullen,³⁶ May

Hydrocephalus.—J. W. Exline¹⁵⁵ Dec., '91 details a case of hydrocephalus, with malformations of arms and hands. The forearm had but one bone and the hands four digits each. H. E. Tuley²²⁴ Jan. 2



PORENCEPHALUS; HYDRENCEPHALOCLE ANTERIOR.
(*University Medical Magazine*.)

tells of a child whose head measured nineteen inches in circumference. It gained at the rate of one-half inch a week, and six weeks later measured twenty-four and one-half inches. Eighty-eight ounces (2640 grammes) of clear serum were withdrawn after death. The brain was found to be very thin, some places being reduced to one-eighth of an inch in thickness. Toujan⁴⁸ July treats exhaustively of two cases of fœtal monsters: one a case of hydro-

cephalus complicated with phocomelus and ectomelus, the second an instance of porencephalus with multiple deformities. Another case of hydrocephalus is reported by M. Murray.^{36 Aug.}

Microcephalus.—A. Moussous^{188 June 5} showed a case of microcephalus with double encephalocele. Bombarda^{549 June 5} publishes an exhaustive and interesting article on a case of microcephalus, together with a careful study of the brain. Another case is reported by Lafuerza.^{619 June 16}

With regard to the deformity of microcephalus, Giaconini^{1006 May} formulates the following statements:—

1. Microcephalism is essentially located in the central nervous system.

2. The deformity of the skull is a result, not a cause.

3. The disturbance is not limited to the brain, but extends to other parts of the nervous system.

4. Microcephalism consists in a retardation in the development of the central system, beginning at various periods.

5. The nervous system exhibits no pathological condition explainable as a result of complete arrest of the development.

6. The brains of microcephalic subjects exhibit all the stages of human-brain development from the earliest on.

7. In the structure of the surface there are modifications which must be referred to atavic reproduction of conditions of the brain of lower animals.

Double Monsters.—D. L. Paine,^{139 Dec., '91} in an article on synotic syncephali and other monstrosities, cites a case that came under his own observation. There were two pairs of arms and legs. From the top of the head to the umbilicus the monster was fused, below that separate. The heads coalesced face to face, the opposite ears being joined into one, there thus being, of course, no face to be seen. The case of double monstrosity detailed by W. J. Smyly^{2 May 28} was of a different character, in that the right sides of both heads were fused together, so that a face appeared on both aspects, with an occiput and ear on either side. As in the last case noted, the bodies were united as low as the umbilicus, making the monstrosity one known as cephalo-thoracopagus.

Lyoff^{121 Aug.} exhibited the cadaver of a male infant with two noses united in the median line, and two triangular mouths at points corresponding to the normal angles of the mouth. Each mouth

had a tongue. In other respects it was normally developed. It died of gradual exhaustion, for, as it could swallow only when milk was placed directly on the tongue, it was nourished with great difficulty. Keister⁸²_{Feb. 6} delivered a double-headed monster, otherwise apparently normal. The extra head was attached to the back of the neck of the body of the child. It was by means of this head that the child breathed and cried. The monster lived fourteen hours.



GASTRO-THORACOPAGUS.
(*Omaha Clinic.*)

F. D. Haldeman¹⁰⁶_{July} reports a case of gastro-thoracopagus. During delivery one-fourth of the connecting-band was torn, resulting in the immediate death of the twins. The upper part of the connecting-band contained the hearts fused together, base to base, with their apices pointing in opposite directions. They were covered by a single pericardium, and each supplied with a full quota of blood-vessels. The lungs were not connected, and were

normally located. The middle division of the connecting-band contained the livers, intimately united. There was a single gall-bladder, double the normal size. The intestines were separate. The kidneys and bladder occupied their normal position. In one of the children there was transposition of the viscera.

Leon¹⁰⁹_{Aug.1} reports a curious case of double monster of the parasitic variety. The patient, a girl 3 years of age, was the daughter of native Mexican parents. She exhibited, on the left gluteal region, some well-marked portions of a foetal face. There were the upper and lower eyelids of the left eye with eyelashes and eyebrows, an upper lip which perfectly covered a part of a rudimentary upper jaw furnished with three or four well-developed incisor teeth, and a small buccal cavity with a rudimentary tongue and some fluid secretion. When the eyelids were separated, a red surface analogous to the conjunctiva was exposed. Near to the groove between the buttocks was a row of silky hairs, and quite close to the base of implantation of the upper lip was a small superficial opening. In the inferior part of the cyst the presence of fluid was detected, and on the surface of the parts were seen some mammillary projections.

Louis H. Mitchell⁷⁷⁹_{Dec., '91} discusses at some length the case of a youth known as Laloo, a case of omphalopagus xiphodidymus, who has been exhibited at the various museums during the past year. The Tocci twins, who have also been exhibited throughout the country the past year,²¹⁷¹ "are connected from the sixth rib downward, and have but one pair of legs and a single abdomen. The spinal columns are distinct until the lumbar region is reached. There they unite at an angle of 130 degrees. The sacrum seems to be a single bone. They have two distinct stomachs, hearts, and pairs of lungs. The arterial and respiratory systems are quite distinct, the heart-beats and breathing differing often in the two individuals."

Two little Uriah girls, 4 years of age, united by means of a bone-like formation at the chest, are announced as having been brought to notice in India. Both feel hungry at the same time, and both fall asleep together. Chiari⁸¹_{Nov. 21, '91} showed a double monster of the type known as thoracopagus tetrabrachius. Labusquière¹⁹¹_{Feb. 18} reports a case of xiphopagus in which there was one umbilical cord.

Phocomelus.—Martin Saint Ange¹⁶⁵_{No.5,91} reports a case of phocomely. The infant was of ordinary dimensions, with the exception of its limbs, which resembled those of an embryo of a few months. There were also some internal anomalies. The fœtus, which was living during labor, was born dead.

Amelus.—J. Schneck⁶¹ attended a woman in her third confinement, delivering an amelous monster. The ends of clavicles and scapulæ could be felt, but no sign of an arm. The legs were represented by teal-like protuberances, half an inch long.

ANATOMY.

By PAUL POIRIER, M.D.,

PARIS.

OSSEOUS SYSTEM.

The Development of Medullary Bones in Man.—Matschinsky, of St. Petersburg, ²⁹_{Nov. 19} basing his studies upon the affinity possessed by newly-formed osseous tissue for aqueous solutions of aniline, and the different degrees of this affinity according to the stages of development, concludes that (1) growth in thickness occurs in the osseous tissue nearest to the periosteum; (2) growth in length takes place by apposition of osseous tissue in the portion underlying the intermediate cartilage; (3) the typical aspect of bones is formed by the alternating formation and resorption of osseous tissue formed at their periphery; (4) the cancellous medullary tissue is formed by resorption; (5) the periosteum and the central marrow act at times as elements of apposition, and at others as elements of resorption, of osseous tissue. As to the interstitial growth of epiphyses, the author merely expresses the belief that it must be very slight.

Regarding the normal structure of osseous tissue, Matschinsky states that in fully-developed specimens the canaliculi are thin and of the same calibre everywhere. In young specimens the canaliculi are wide, and assume a varicose aspect. When the Haversian canals are examined during their formation, they are found to be surrounded, to a great extent, by a more or less great homogeneous lamella, presenting at its free border many bone-corpuscles. The canaliculi, on reaching this lamella, suddenly come to a stop, their tips becoming slightly funnel-shaped or broader. They can be traced in the homogeneous layer, and may even be seen to connect with the Haversian canals. The author also concludes that the formation of osseous tissue precedes the formation of the canaliculi, and that canaliculi already present in fully-organized tissue penetrate, by extension, the osseous tissue in process of organization.

(H-1)

Herbert R. Spencer has examined the head of the humerus in one hundred and eighty fœtuses, many of which were before term. He found in fourteen cases an osseous nucleus, having the appearance of a No. 6 bullet. Forty of these fœtuses were at term, and weighed 7 pounds or more; and among them nine epiphyses were found. The following are the conclusions of the author: 1. A point of ossification at the head of the humerus is often found, in the fœtus at term, at the time of birth. 2. In the large fœtus, weighing 7 pounds and more, the centre is generally found at least in a proportion of 22.5 per cent. The frequent presence of this point is important from a medico-legal stand-point.

Regeneration of Blood-Corpuscles of Medullary Bone.—H. Freiberg¹³_{B.235, No.3} gives an interesting account of his work on this subject, his studies being made upon rats, cats, and rabbits. Histological examination of the bone-marrow—at times after sanguinary effusions, at others after splenectomies—gave the following results: The normal bone-marrow of adult animals may be closely differentiated from that of animals freely bled. This differentiation, on the contrary, is impossible in young animals. The differences manifest themselves in the interior of the vessels, and consist in the presence of many small blood-corpuscles containing a nucleus, in dilatation of the venous capillaries, and in a diminution of the fat-corpuscles and leucocytes of the parenchyma. These changes, however, were not always proportional to the quantity of blood lost.

The formation of new blood-corpuscles took place in the interior of the venous capillaries, the endothelial layer of which, thinner and nucleated, was very plainly to be seen in certain parts. It was impossible to ascertain exactly if the red globules were primarily white, or if they contained hæmoglobin from the time of their formation; at any rate, the transition stage from colorless to red was never observed. The disappearance of nuclei occurred by their dissolution in the interior of the cell. The giant-cells augment in size and number after sanguineous effusion. They are probably derived, for the most part, from the large cells of the marrow, multiplication being affected by mytosis of an atypical and irregular character. They seem to contribute to phagocytosis, and contribute to the formation of leucocytes by division; but a small number, however, take part in this process. The changes

caused by splenectomy are manifested in the bone-marrow by small grains and yellowish corpuscles enclosed, for the greater part, in cells. No cells containing blood-corpuscles could be found. After splenectomy, an increase of blood-corpuscles could be observed, but not with the naked eye. The examination of the bone-marrow of rabbits upon whom splenectomy had been performed showed neither increase in number of the red nuclear cells, nor augmentation in the volume of cells containing siderin.

It may be said, in summing up, that in the normal state the destruction of blood-corpuscles takes place in the spleen, to which it seems to be limited, while the formation of the same blood-corpuscles finds its main origin in the bone-marrow, the peripheral zone contributing the most to the creative process.

Appearance of the First Epiphysial Point of the Long Bones.—Julien⁹²⁰_{Apr. 11} states that the first point of the epiphysis of the long bones always appears at its extremity,—an important fact from a functional point of view.

Inequality of the Two Halves of the Adult Pelvis.—C. Hasse, of Breslau, states that the difference in the two halves of the body is well known, though it can only be observed in the skeleton. The inequality of the pelvis may be ascribed to three causes: (1) tendency of the vertebral column to lateral deformity (scoliosis); (2) rotation of the vertebral column on its axis; (3) predominance in weight of the right half of the body. On account of this lack of symmetry, the pelvis minor and its axis are found directed from the left toward the right, from above downward, and from before backward. The walls are turned from left to right, and the right wall is more curved than the left. The superiority in size of the right side is principally shown by the greater size of the right wing of the sacrum and the greater inclination of the right iliac fossa.

The Parietal Foramen.—In a contribution to the study of the parietal foramen, W. M. Barton gives the results of his observation on one hundred and twenty-five skulls. He presents the following table:—

Parietal foramen present on both sides	48
“ “ “ on right side	37
“ “ “ on left side	23
“ “ absent on both sides	17

125

Anatomical Relations of the Frontal Sinus and its Orifices.—

Taking into consideration the great variability in size and form of the frontal sinus, Hartmann⁶⁹_{July 8} endeavors to prove irrefutably that the naso-frontal canal does not exist, that the frontal sinus is prolonged to the anterior edge of the middle turbinated bone, and that it is by means of a broad cleft that the frontal sinus opens into the middle meatus. In the majority of cases, the portion of the frontal sinus situated beneath the turbinated bone is found to be restricted by the ethmoidal cells, which leave between them a free space which may be regarded as the naso-frontal canal. This canal opens normally in the anterior furrow.

[I am not of the opinion of Hartmann, the numerous researches made in my laboratory with the aid of Guillemain²⁷¹₉₁ having led me to conclude that the naso-frontal canal certainly exists.—Ed.] Measurements as to length and diameter were published in the paper referred to. Paul Poirier, Paris,²¹⁹³ in a work upon anatomy comprising the head, the skull, the meninges, the brain, the ear, the scalp, the frontal sinus, and the central nervous system, gives the state of knowledge at the present time. The study of the skull includes the mechanism of fractures, and is based upon personal researches. The lymphatics of the meninges and the brain are also studied. The work gives indications based on a study of over one hundred crania, enabling the operator to reach with certainty any part of the brain. The ear has also been the object of special attention. In another work,²¹⁹⁴ written for students, the same author has paid special attention to the anatomy of the bones and their anomalies, based upon a careful study of a collection of bones which he considers the largest in existence. Among the points not as yet described may be mentioned the occipital tubercle to be found on each side of the foramen magnum and grooved at its posterior part for the passage of the spinal, pneumogastric, and glossopharyngeal nerves, and the groove formed on the anterior surface of the sacrum by the lumbo-sacral trunk.

MUSCULAR SYSTEM.

Striated Muscular Fibre.—A. H. Pilliet,⁷_{July 17} has studied the formation of striated muscular fibre in insects, vertebræ, and in man. He admits that this striation is due to grains of myosin along the length of the fibrillæ. When these are striated, the grains are

disposed in the interval of the striæ. Certain fibrillæ show lateral denticulation, the spurs of which correspond to the fibrillary striæ. These, in that case, would be primarily homogeneous fibrillæ, inclosing the grains of myosin,—a pure hypothesis, however. J. B. Haycraft³⁹¹ has studied the finer structure of striated muscular tissue by means of tracings obtained on collodion. The transverse structure of the fibre could hardly be attributed to layers of greater or less thickness. The appearance of light and dark bands is due to a varicosity of the fibrillæ, the inherent substance of which is homogeneous. G. Schwalbe and R. Mayeda publish an article³⁹¹ on the muscular striated fibres in man, as does also N. Mihaljovits.²⁶⁵

Aponeuroses of the Palm of the Hand.—F. Leguen and Juvara⁷ show that all the aponeurotic and fibrous tissues of the hand form one continuous system. Besides the transverse fibres of the superficial aponeurosis and the deep ligament, other transverse fibres, after a complicated course, pass across the intermetacarpal spaces, to enter behind the metacarpal heads, forming a transverse system in continuity with the first. The different planes—superficial, middle, and deep—are united by antero-posterior fibres, which assure their firm union. The transverse fibres unite at the cubital or radial edge of the hand, strengthening and regulating the cavity necessary for the hollow of the palm. This hollow is itself divided in its inferior segment into special canals, running to the tendons, muscles, vessels, and nerves. The deep transverse segment exercises a strong action in maintaining the reciprocal relations of the metacarpals.

The Scaleni Muscles.—Sébileau⁹²⁷ believes that there is, in reality, but one scalenus muscle, which is divided below to allow the nerves of the brachial plexus and the subclavian artery to pass. The reasons which cause him to hold this belief are: (1) the uniform insertion of the entire scalenic mass; (2) the anastomotic layers which often exist between the anterior and posterior scaleni; (3) the division sometimes found in the anterior scalenus for the passage of the subclavian artery; (4) the division of the posterior scalenus for the passage of the brachial plexus, as observed in certain subjects; (5) the fusion upon the summit of the pleura of the pleuro-transverse muscle and the costo-pleural ligament,

The scalenus is formed, he concludes, of a group of intercostal muscles. It is, in fact, but a long intercosto-cervical muscle reaching from one side (anterior tubercle of the transverse apophyses) to the other.

Development of the Masseter Muscle.—Kayzander ³¹⁶_{B.G.H.} states that the insertions of this muscle do not undergo any displacement in the course of development, for they not only find their origin upon Meckel's cartilage, but also on the zone of embryonal elements surrounding the latter.

The Function of the Peroneus Tertius Muscle.—Ramsey Smith ³⁶_{Jan.} describes the function of the peroneus tertius muscle.

NERVOUS SYSTEM.

Course of the Centripetal Fibres in the Spinal Cord.—Berdey ¹⁹⁷_{No.5} made use of the secondary degeneration process, consecutive upon the section of the posterior roots, in a guinea-pig, and for the study of this degeneration he had recourse to the method of Marchi and Algeri. The following are the conclusions drawn: 1. The long fibres of the columns of Goll are mostly the direct continuation of the posterior radicular fibres. Many of these fibres leave the posterior columns of the cord as they extend upward into the medulla, but others ascend from the cauda equina to the bulbar nucleus. 2. The internal portion of the posterior columns is not composed entirely of fibres of radicular origin; it may be supposed that they may originate in the gray substance. 3. The ascending degeneration affects the two antero-lateral cords; first, the gray substance, and higher up the periphery of the cord.

The Striæ Acusticæ.—According to Bechterew, ²¹_{May 25} many authors agree in the belief that the *striæ acusticæ* are found in connection either with the radicular fasciculi or with the origin of the acoustic nerve. He has formerly demonstrated that this interpretation cannot be correct as regards the human subject, the medullary striæ being developed much later than the primary fasciculi of the acoustic nerve. He believes that the medullary striæ start from the white substance of the cerebellum, in the neighborhood of the flocculus, and serve as commissural fibres for the basilar portion of the cerebellum. Starting from the cortex of the convolutions of the flocculus, the fibres follow the base of the flocculus,

rising along the hemispheres of the cerebellum (those surrounding the restiform body) to reach the lateral border of the floor of the fourth ventricle.

Structure of the Olfactory Bulb.—Von Kolliker, ³⁴_{Jan. 2} after recalling his monograph, published two years ago, on the embryological development of the olfactory nerves, studied the structure of the olfactory bulb. The olfactory glomeruli are described by him as spheroidal corpuscles of about 0.1 millimetre on the average.

According to the researches of Golgi, Ramon, von Gehuchten, and his own, the ramifications of the olfactory fibres can be traced, on the one hand; while, on the other, the terminals of the protoplasmic prolongations arise from certain nerve-cells situated in the neighborhood of the glomeruli. Von Kolliker compares these glomeruli, which should be considered as formed by the intertwining of two kinds of neighboring fibres, with the cerebral ganglia of vertebrates. In those ganglia may be found a finely-punctated substance, composed of a net-work of very fine nervous ramifications. He also recognized the presence of neuroglia; the glomeruli are surrounded by vessels, and are penetrated by isolated capillaries. Concerning the connection between nerve-fibres and the prolongations of the glomerular cells, he concludes as follows: 1. The nervous protoplasmic prolongations of cells serve for the transportation of nervous stimuli. 2. Under certain circumstances stimuli can be transmitted from one nerve-fibre to another without passing through the cells of the ganglion.

The Cranial, Sensory, and Motor Nerves.—E. Bregmann ³⁹⁵_{B. 11} states that it is usually thought that in a divided nerve degeneration manifests itself only in the portion separated from the trophic centre. As a result of researches, conducted after the method of Marchi, it was shown that the degeneration involved the cerebral end as well. Bregmann divided several motor and sensory nerves, and traced the course of the degenerated fibres into the interior of the encephalon. In relation to the facial, neither radicular, crossed fasciculi, nor fibres (which, according to Mendel, are directed toward the oculo-motor centre and enter the posterior longitudinal cord) could be detected. As to the ascending root of the trigeminus, certainty exists to the effect that the corneal fibres cross the ven-

tral portion of the root. When, notwithstanding an incomplete section of the trigeminus, the corneal reflex was obtained, the dorsal portion of the ascending root was alone found degenerated. The crossed root of the oculo-motors of Gudden could be beautifully seen. Their fibres usually enter the dorsal portion of the "contra-lateral" nucleus. Many roots coming from the trochlearis pass beyond the nucleus to the posterior longitudinal fasciculus, passing through its ventral portion.

The Trigeminal Root.—According to Poniatowsky,<sup>395
B.11</sup> the ascending root of the trigeminus does not receive its fibres from the base of the posterior cornua or from the head of the latter. The crossed root of the trigeminus originates, as far as its motor fibres are concerned, from the middle of the motor centre of the opposite side. The trigeminal crossed fibres do not seem to come from the locus cœruleus. The sensory root also receives a supporting fasciculus from the middle portion. The descending root of the trigeminus is close to the motor root in mammals. As to the trigeminal root originating in the cerebellum, either it does not exist or it can only be seen with great difficulty.

Structure of the Cerebral Cortex in Certain Mammals.—Ramon y Cajal<sup>795
v.9, No.1</sup> conducted his researches by the aid of Golgi's method, perfected by himself. The most superficial layer of the brain contains nervous elements presenting several axis-cylinders. In this layer are found the terminations of (1) the axis-cylinders arising from the deep cells of the cortex; (2) the axis-cylinders coming from the cells of the cortex proper; (3) the collateral fibrillæ originating in the tubes of the white substance. The fibres of the corpus callosum are either collaterals of the fibres of association and of projection, or direct axis-cylinders coming from the smaller cells of the cortex. All the axis-cylinders originating in the elements of association and the callous elements, as well as their collaterals, terminate in the gray substance, by means of free and intercellular arborizations. The collaterals of the axis-cylinders of the pyramids terminate in non-ramified varicose extremities. In the white substance of the brain are found collateral fibrillæ which terminate in the cortex in varicose arborizations. No inosculations exist among the nerve-fibres of the gray substance.

Structure of the Optic Lobes in the Embryo of the Chicken.
—Von Gehuchten⁷⁹⁵_{v.8, No.1} states that in the optic lobes of the embryo of the chicken, at the eighteenth to twentieth day of the period of incubation, may be distinguished: 1. The layer of retinal fibres in which terminate the fibres of the optic band. 2. The layer of optic-nerve cells, composed of cells which send their protoplasmic prolongations between the retinal arborizations of the external layer. 3. The layer of central optic fibres, furnished with nerve-fibres, originating sometimes in the optic-nerve cells of the middle layer, at others from an unknown source; they terminate in the two external layers.

Origin of the Acoustic Nerve.—L. Sala⁴⁶⁹_{v.16, p.196} concludes that: 1. Neither the nucleus of Deiters, the posterior or dorsal nuclei, nor the nucleus of Bechterew are the original nuclei of the fibres of the acoustic nerve. 2. The anterior or vertical nucleus and the tuberculum laterale of Stieda are, on the contrary, the nuclei of origin; the first for the internal portion of the posterior root, the second for the posterior portion of this root. 3. The anterior nucleus is composed of two kinds of cells, which are joined to the central and the peripheral cells. 4. The posterior root has a posterior portion (striæ acousticæ) arising from the superficial and deep cells of the anterior nucleus; the other, the anterior portion, arises in the nervous net-work of this nucleus.

The Corpus Callosum.—Blumeneau²⁹_{v.37, p.1} states that the corpus callosum is developed in several stages. The portion situated in front and above the foramen of Monro is first developed. From this locality prolongations extend forward and backward, thus completing the development. Immediately after the formation of the callous fasciculi a progressive fusion of new zones of the internal walls of the hemispheres takes place. In this manner the corpus callosum becomes covered, over its entire external free surface, with a cortical layer originating in the embryonic cortex.

The Dorsal Nucleus of the Vagus.—From the very complete observations made by Harold Holm, of Christiania, on the anatomy and pathology of the dorsal nucleus of the vagus, the following anatomical facts were evolved: The dorsal nucleus of the vagus is in direct relation with the solitary bundle. There exists a group of ganglioniform cells, unknown up to the present time,

in which arise nearly the half of the fibres of the vagus. The nerve-fibres issuing from this group take a course very similar to that of the fibres which form the genu facialis. The glosso-pharyngeal nerve, like the trigeminus, has, besides, a sensitive ascending root as well as a motor descending root. From the results of these researches the author concludes that he has a right to adduce the following physiological conclusions: The centre of the tracheo-bronchial reflex is probably localized in the dorso-lateral portion of the dorsal nucleus of the vagus, in the small ganglion-cells of this nucleus. The respiratory centre is situated in the ventro-median portion of the dorsal nucleus of the vagus, in the group of large cells of this nucleus.

J. Pantou, of Kansas City,⁷²_{Feb.} reviews the actual state of our knowledge concerning the anatomy and physiology of the brain. He specially insists upon the fibres passing through the internal capsule.

According to J. P. Morat,³_{June 22} the trophic centre of the vasodilator nerves is found in the ganglion of the posterior root.

The Conus Medullaris.—Brautigam³⁰⁵_{B.11} states that a careful examination of the conus medullaris will demonstrate that it can be considered as a portion of the spinal cord, the development of which has, at some time or other, become arrested, and which, though still presenting embryological characters, has, by the influence of time, undergone sundry modifications. The posterior commissure is composed of the three different kinds of fibres. The shape of the gray cornua seems to differ according to sex.

Preservation of the Encephalon.—Teichmann recommends the following convenient method for the preservation of the encephalon in the dry state: The pieces are rendered anhydrous by means of alcohol. They are then left several weeks in essence of turpentine, often renewed, and maintained at a constant temperature of from 30° to 40° C. (86° to 104° F.). They are then allowed to dry.

Nervous Supply of the Uterus and Ovaries.—Otto von Heff, of Halle,³⁴_{Jan. 26} after utilizing the methods of Golgi, Ehrlich, and the bichloride of gold, considers that of Alt (Congo stain) as the best, though far from satisfactory. The large nerve-trunks of the uterus, the myelin fibres of which lose their sheath of Schwann and their myelin on entering the organ, are directed obliquely toward the ves-

sels of the walls and subdivided into small branches, which shape their course toward the mucous membrane. In the mucous membrane proper, except at the base, the author never found nervous elements. As is the case everywhere, there are nerves that enter the uterus alongside the vessels. The greatest proportion of uterine nerves is to be found in its muscular system. The largest fasciculi, upon penetrating the organ, form a net-work with broad and equal meshes. Before forming this net-work, they dichotomize at different angles and produce bundles, usually quite large in size, but at times extremely attenuated. It is but seldom that short inosculations are observed soon after their subdivisions. The course of all these fibres is usually straight. Occasionally, however, fibrillæ curled upon themselves, thus forming ring-like outlines, are to be observed. From this net-work medium-sized bundles are sometimes found to start, following a straight course along the fibres of the cellular tissue interposed between the muscular fibres. At times the bundles give off small branches which penetrate the muscular cells. The axis-cylinders of these branches ultimately subdivide into fibrillæ, each one ending at a separate muscle-corpuscle in a special manner. It seems to approach the nucleus as if it would penetrate it, but on closer inspection by means of an immersion objective of very high power, it may be observed to merely lie in contact with it, the nucleus having in turn come in contact with the cellular envelope or membrane. The axis-cylinder may also touch several nuclei before meeting the one upon which it is to terminate. The author could not observe any degree of penetration of the nucleus by the nervous fibril, nor any other mode of ultimate ending of the latter.

He concludes that the nervous excitation is transmitted by contact to a few privileged muscle-corpuscles, which privileged corpuscles, by some mechanism or other, cause contraction of the other muscle-corpuscles,—those not directly under the nervous influence. He also noticed, in nervous fasciculi of rather large size, thick cells which he considered as ganglion-cells (also Alt's opinion). The wealth of nerves in the uterus is very great; it is always proportionate with the muscular layer, and much greater in a woman in the puerperal state than in a virgin. In the tubes the nerves are disposed in the same manner as in the uterus.

In relation to the nervous supply of the ovaries, he states as

a preliminary remark that the nerve-fibres, with and without myelin (the former soon lose their myelin and their sheath of Schwann), which penetrate the stroma of the ovaries, are divided into two groups. The first comprises the fibres that encircle the vessels, and terminate at the muscle-corpuscles as in the uterus; the second group comprises the fibres penetrating the parenchymatous zone toward its centre, and thence terminating in an arborescent distribution giving the appearance of a reticulum formed by intercrossing fibres. This net-work of fibres gives off fine fibrillæ which surround the follicles; it also sends a few fibrillæ to the superficial layers of the organ, describing a curve in order to pass under the epithelial layer so as to surround other follicles beyond. Other fibrillæ follow a course parallel to that of the epithelial cells, sending once in awhile a few fine terminal branches which penetrate between the epithelial cells in the form of exceedingly fine points. The isolated follicles are surrounded by numerous axis-cylinders, at times absolutely circular, at others semicircular. These axis-cylinders either send fine branches, or terminate, as described above, by curving under the epithelial layer, or ending between the epithelial cells, according to the activity of the follicle. The last ramifications terminate in a corpuscle, generally that nearest the nucleus. Are there ganglion-cells in the ovaries? By means of Golgi's method he found elements presenting a close analogy to ganglion-cells. They were situated at the margin of the parenchyma, and grouped around a certain proportion of the vessels of the stroma. No opinion is expressed by the author concerning them.

Researches on the Anatomy of the Central Nervous System.—

Waldeyer, ⁶⁹_{No. 44 et seq., '91} after bibliographical and personal researches, formulates the following propositions: (1) the axis-cylinder of any nerve-fibre (whether centrifugal or centripetal) originates from a cell, and never from a fibrous reticulum; (2) the nerve-fibres always terminate freely by arborization, without the formation of meshes or inosculations. From these two propositions result the following fundamental law: "The nervous system is composed of an infinite number of nerve-units (neurones), distinct anatomically as well as in their embryological development. Each neurone is composed of a nerve-cell, of a nerve-fibre, and of a terminal arborization. The physiological conduction takes place from the cell toward the terminal arborization, and inversely; the motor current

goes from the cell toward the terminal arborization; the sensory current, on the contrary, goes at times in the one direction, at times in the other." Through the presence of numerous collateral channels the necessity of isolated conduction is not experienced. The fundamental substance of the nervous system does not form an inosculating net-work, but constitutes a felt-like organization, characterized by a multitudinous intercrossing of fibres, but among which no inosculation occurs. The passage of the nervous current (nervous waves) does not take place through continuity, but through contiguity.

VASCULAR SYSTEM.

Sébileau and Demoulin, in an article on the manner in which the anterior jugular venous system should be considered, summarize their views as follows: 1. The carotid artery, which extends from the mediastinum to the brain, is formed by the common carotid below and by the internal carotid above. 2. This artery furnishes important branches to all the organs of the head and neck, these branches taking their origin in the common trunk,—the external carotid. 3. The carotid artery is accompanied by a large vein,—the deep carotid vein (the internal jugular). 4. This large vein receives all the venous branches corresponding with the arterial branches given off by the artery of which it is the companion; but these branches, instead of uniting into a common trunk and thus corresponding with the external carotid, always remain more or less dissociated. 5. The deep carotid vein may alternate functions with two superficial carotid veins (anterior and external jugular). 6. These superficial carotid veins are never collateral collectors; they are in reality vast anastomotic channels between points widely separated from the deep venous system; they always arise from a deep vein, and always return to a deep vessel. They merely include in their passage a few superficial veins of no importance. 7. The superficial carotid veins anastomose and mutually interchange functions, if need be; when the one is large, the other is small. 8. The venous system of the neck differs in no way from that of the limbs; it comprises a deep, large vein of primary importance, and furnished with several superficial accessory veins. 9. The arrangement of the deep venous system is fixed and regular; that of the superficial, variable and subject to anomalies.

Vascular Supply of Nerves.—Quénu and Lejars⁹⁴_{Jan.} conclude, after a study of this important subject, that: 1. The superficial nerves are accompanied along their entire length by an arteriole in juxtaposition with them. 2. Each nervous trunk has its own arteries, which in turn always originate in the same manner. 3. A venous trunk never receives all its arterial supply from one arterial trunk only. 4. The veins of the superficial nerves always terminate in deep veins. 5. The veins supplying nerves acting as consorts to arterio-venous plexuses either communicate with the neighboring large veins, or with the vaso-vasorum encircling the artery, or with the muscular collateral vessels. 6. The veins of the nervous plexuses communicate with the collateral channels of muscular origin. Finally, there is to be found, around the peripheral nerves, all the vascular wealth surrounding the different parts of the central nervous system.

The Meningeal Artery.—Peli⁶⁸⁶_{Nov., 91} conducted a series of studies to determine the relative depth of the meningeal-artery groove in the inner table of the skull in sane and insane subjects. [I regret that he did not take advantage of the opportunity to study the venous grooves which form on the side of the middle meningeal (the sphenoparietal sinus of Breschel), an anatomical point somewhat overlooked nowadays, and which I have studied in detail.—ED.]

Superficial Jugular Veins and Thyro-Cervical Arterial Trunk.—P. Duval, of Bordeaux,⁷⁰_{Jan. 24} writes an interesting review of this subject. *Jugular Veins.* 1. Anterior jugular. According to the teachings of Marcellin Duval, this vein should be recognized as taking at its terminal portion a horizontal retroclavicular course. The vein terminates not in the subclavian, but in an ampullar dilatation occasioned by the union of the subclavian and the internal jugular. 2. External jugular. The superficial and deep portions should be considered apart. The former passes in front of the omo-hyoid, rarely behind; the latter begins at the spot where the vein sinks under the sterno-mastoid, taking a rectangular course, first horizontal, then subclavicular, emptying into the confluent of the other jugular veins,—the subclavian, etc.

Thyro-Cervical Arterial Trunk.—The many different descriptions published of the branches of the subclavian render their study very difficult. The confusion existing in books arises from

the fact that a fourth artery, the transverse superficial cervical of Marcellin Duval, is overlooked. A standard description of the vessels of the region might be established as follows: At the internal border of the anterior scalenus arises, from the subclavian artery, a small branch which soon bifurcates into two branches; the one is vertical, the inferior thyroidian, acting as ascending vessel; the other, horizontal, and lying along the anterior surface of the anterior scalenus, upon which, after a short course, it again subdivides into two branches,—the superior scapular below, the transverse cervical above. The latter branch is destined for the subclavicular triangle, and loses itself in the trapezius. It is situated under the middle aponeurosis, in front of the brachial plexus, from which it is separated by the sheath of the scaleni. Outside of the scaleni originate the subclavian, the posterior scapular (the transverse cervical of the classics). This must not be confounded with the superficial transverse cervical, which originates in the thyro-cervical trunk, in the anterior scalenus. The posterior scapular, on the contrary, originates directly from the subclavian outside of the scaleni. If the name “transverse cervical” is to be preserved, these two arteries should be called “superficial transverse cervical” and “deep transverse cervical.”

The Circulation of the Encephalon.—According to Kolisko, the anterior choroid artery almost always arises from the carotid. One branch goes toward the point of the temporal lobe; its obstruction brings about olfactory troubles. The posterior portion of the inner capsule is for the greater part nourished by the anterior choroidal artery; hence the total emboli of this artery and the total hemiplegiæ and hemianæsthesiæ. The genu of the inner capsule receives its blood from the posterior communicating artery; hence the obstructions and divers manifestations and hypoglossal regions.

The Venous Lacunæ of the Dura Mater.—Trolard¹⁶⁵_{No. 1, p. 28} describes the venous lacunæ of the dura mater as follows: (1) elongated form (in the sagittal plane); (2) separation from the veins of the encephalon; (3) communication with the neighboring encephalic veins by means of small openings; (4) communication with the superior longitudinal sinus by means of several small openings and a large fenestra; (5) numerous communications with the veins of the diploë; (6) they always contain pacchionian

granulations; (7) trabecular structure. These descriptive characters differentiated them from the venous lacunæ of the venous ampullæ to be found in the neighborhood of the superior longitudinal sinus. They may be considered as safety-channels.

Trolard considers the granulations of Pacchioni as arachnoid productions, owing their origin to hernia-like projections of the latter in the cerebro-spinal fluid and forming at spots where the dura mater presents small slits. The contents of those arachnoid herniæ assume greater consistence each day, and they finally become invaded by lime-salt deposits, while the walls become thicker by secondary alteration products from the enveloping membranes of the brain. The pia mater itself is sometimes involved in these products to a degree rendering the arachnoidal origin hardly discernible. As to the microscopical structure of these granulations, Trolard mainly cites the works of Key and Retzius. He experiences considerable difficulty in settling the question regarding the development of the granulations in the interior of the lacunæ, or that concerning the development of the lacunæ around the granulations. At any rate, he admits that the granulations are the first to exist.

Veins of the Forearm and Hand.—Thibaudet²⁰⁰⁷₉₁ states that all the superficial veins of the palm terminate in a peripalmar superficial venous circle: (1) outside, by the cephalic of the thumb; (2) inside, by the annular; (3) below, by the subcutaneous anastomotic palmar; (4) above, by a venous plexus forming the origin of the median vein of the forearm.

Abnormal superficial jugular veins, a small supplementary trapezo-clavicular muscle, an anomalous thyro-cervical arterial trunk, and an abnormal interval between the branches of the external carotid were all found in the one subject by P. M. Duval.⁷_{v.5,p.232}

RESPIRATORY APPARATUS.

The Membranous Portion of the Trachea.—Lejars, of Paris,⁹¹_{Apr.,91} accepting the ideas formulated by Nicaise concerning the living trachea, conducted a series of most interesting mensurations in connection with its calibre. He recognizes two types of tracheæ,—one in which the membranous portion is broad, the other in which it is narrow. The membranous portion projects into the interior of the tracheal channel during life, the extremities of the incom-

plete rings being in contact. It is quite evident that, the greater the membranous portion happens to be, the greater will the difference of calibre of a trachea become in the dead and the living subject. This point is a very important one to the surgeon when called upon to introduce a tracheal cannula.

The Relations of the Bronchi to the Posterior Wall of the Thorax.—Bianchi and Cocchi,⁹⁹ after an examination of twenty-one cadavers, conclude that the trachea bifurcates opposite the body of the fifth dorsal vertebra, its inferior extremity being slightly to the right of the median line. They also noticed that the right bronchus, which descends somewhat more obliquely toward the left, corresponded with the fifth intercostal space. The course of the left bronchus is parallel to that of the sixth rib.

Suspensory Apparatus of the Pleura.—Sibileau, of Paris,⁷ July, '91 describes a suspensory apparatus of the pleura formed by two kinds of fasciculi more or less confounded below, but quite distinct above. The one is superficial, and directed upward and inward; the other is deep, and directed downward and outward. The superficial fasciculus is usually muscular, sometimes fibrous. It detaches itself from the transverse apophyses of the seventh cervical vertebra, and sometimes from the sixth. It descends from those points to the summit of the pleura, thence extending to the first rib. The second fasciculus is fibrous. It arises from the external portion of the preceding fasciculus at the seat of attachment to the first rib, and subdivides into two branches,—one internal and the other external. Both extend to the summit of the pleura. He considers the apparatus as a continuation of the scaleni.

Topography of the Pulmonary Interlobular Fissures.—E. Rochard¹⁰⁰ Feb. 23 states that on the right side the great fissure begins 9 times in 12 opposite the fifth interspace, between five and ten centimetres of the median line. It is directed upward and backward, describing a convex outline upon the lateral surface of the lung at the level of the infra-axillary line. Nine times in 12 it corresponds with the fifth rib, or with the intercostal spaces on a level with the axillary line. It terminates at the posterior part of the internal surface of the fifth rib 3 times in 12, at the posterior portion of the fourth intercostal space 3 times in 12, at the posterior portion of the fifth intercostal space 2 times in 12, thus making 8 times in the region of the fifth rib. The small horizontal fissure

begins 7 times in 12 in the third intercostal space. It is directed backward, and always terminates very irregularly in the great oblique fissure behind the axillary line. Its connections with the fourth rib are important. On the left side the solitary fissure begins in the fifth intercostal space 5 times in 12, 4 times in the sixth, thus making 10 times in 12 in the region of the sixth rib. It arises between six and seventeen centimetres from the median line, from which it is directed upward and backward, describing a convex outline on a level with the infra-axillary line. It generally follows the fifth rib, occasionally the fourth, and rarely the sixth, and terminates somewhat below the vertebral extremity of the third rib.

An interesting paper in this connection is that of Quénu, of Paris, ⁷_{July 22} on the mediastinal pleura of solipedæ.

DIGESTIVE APPARATUS AND ADNEXA.

The Frænum of the Upper Lip.—II. Gillet ⁶²_{Jan.} states that the frænum of the upper lip is generally sharp and falciform. It may assume the shape of an hour-glass, if its extremities are broad. It may be fan-shaped, if its anterior portion alone is wide. Its free edge represents the outline of the lower nasal processes, and it can occur as a bifid frænum by a longitudinal furrow forming two edges instead of one, as usual.

Structure of the Intestinal Canal in Children.—Goundobine ³⁶⁶_{B.32, II.4} found that the stroma of the mucous membrane of the small intestine of children was composed of adenoid tissue (His) or cytogenous tissue (Kölliker). In the adult the tissue of the duodenum is thicker, that of the ileum thinner, than that of the jejunum. In the newborn and the infant this peculiarity is less marked; it is only toward the seventh year that the membrane can in no way be distinguished from that of the adult. The epithelium presents the same structure (cylindrical and, at times, caliciform cells), and presents the same dimensions as in the adult. In the newborn, as in the adult, valvulæ conniventes, villousities, and glands are to be found. The length of the folds, and their depth also, are less marked than in the adult. In the upper part of the jejunum the folds measure 0.2 to 0.5 millimetre in the newborn, 1 millimetre and over in children 1 year old, and 2 to 3 millimetres in children between 3 and 4 years of age. The folds

are less numerous in the infant than in the adult, being, in fact, somewhat in the rudimentary state. The villousities in the case of the newborn differ in no way from those of the adult; in the former they are less numerous, while their dimensions are smaller than in the latter. The glands of Lieberkuhn are, in the newborn, 95 to 110 μ in length and 16 to 35 μ in width. They are close to one another, and the thickness of the mucous membrane separating their base from the muscularis mucosæ is from 6 to 15 μ . The author, speaking of those glands, states that the development of the glandular tissue is in keeping with that of other parts of the intestine, and that the structure of the glands of Lieberkuhn is the same as in the adult. Their number is relatively greater in the newborn than in the adult. The glands of Brunner are more numerous, both in the newborn and in the infant, than in the adult. They are closer together in the duodenum, and their glandular elements are still in the initial stage. A peculiarity of the submucous tissue in children is the limited amount of elastic tissue found therein, and the wealth in cellular elements, blood-vessels, and nerve-fibres. Its minimum thickness does not surpass that of the circular layer of muscular fibres. The muscular layer of the intestine is but slightly developed in the newborn. The vessels and villousities are as numerous in the newborn as in the adult. The nerve-fibres are much thinner in the nursling than in the adult. The structure of the solitary follicles is the same in the infant as in the adult, but their dimensions are not so great. Their number increases with age in the small as well as in the large intestine. The anatomical distribution of Peyer's patches is the same in the infant as in the adult.

GENITO-URINARY ORGANS.

Position of the Uterus.—Charpy¹⁰⁸⁸_{Apr.} concludes (1) that retroversion of the uterus in the dead subject is a certainty; (2) that the position of the uterus in the living is uncertain, and that, in consequence, the first position should, for the present at most, be considered as the normal one.

Muscular Fibres of the Uterus.—Girode, of Paris,⁹²⁷_{Feb. 6} found, in the uterine wall of a woman aged 24 years, who had died of puerperal scarlatina, complicated by general secondary infection by the staphylococcus pyogenes aureus, a rich layer of striated muscular

tissue. The striated fibres occupied a zone corresponding with about one-third of the thickness of the wall involving the portion nearest the uterine cavity. These fibres were generally transverse, corresponding with the uterine outline. Their calibre was normal, and none could be found grouped in fasciculi.

Bladder and Urethra.—Delbet²⁶⁶_{Mar.} conducted a series of experimental researches upon the anatomy of the bladder and urethra. In children the empty bladder rises two centimetres above the pubis. Douglass's and the prevesical space are about on a level with the upper part of the pubic arch. In the adult the empty bladder sinks entirely into the pelvis, but rises above it when full. The urethra and the vesical neck are situated beneath a line passing the symphysis pubis, about three centimetres from its posterior surface. The position of the neck varies with the movements of the pelvic floor and according to the degree of distension of the rectum. The empty bladder in the child presents two surfaces, postero-superior and antero-inferior. In the adult male the prostate presents a superior surface so obliquely inclined that the retro-urethral portion of the bladder is necessarily very small and follows almost exactly the postero-superior surface. In woman the retro-urethral portion of the urethra can hardly be said to exist, and is about disposed as it is in the child.

The Evolution of the Prostate.—The prostate is developed in the same way in dogs and in man, through a terminal and lateral dilatation of the channels. This dilatation gives to the gland, in general, an alveolar conformation. Throughout the entire period of activity of this gland the epithelial element predominates, but with age hypertrophy of all its elements is developed. If concretions are formed in the alveoli, this normal process becomes transformed into a pathological process, and terminates in hypertrophy of the cellular tissue, with atrophy or even total disappearance of the epithelial element.

Surgical Anatomy of the Ureter.—Researches were undertaken by Cabot, of Boston,⁵ with the object of establishing the various points in the course of the ureter which are surgically accessible. The ureter is adherent to the peritoneum by means of fibrous bundles, and it is impossible to detach the serosa without also involving the conduit itself. Cabot has convinced himself, by the examination of numerous subjects, that the ureter is

always located immediately beneath the line of attachment of the peritoneum to the vertebral column. As the ureter sinks into the pelvic cavity it becomes less easy to locate it, as it does not present any fixed osseous relation to serve as a guide. In order to reach the ureter in the upper portion of its course, a line should be drawn, starting from the anterior edge of the sacro-lumbar mass, a finger's breadth below the twelfth rib, and parallel with the latter to its extremity; then giving the line a downward direction, its course is directed toward the middle of Poupart's ligament, until the point is reached where the incision is usually made for the ligation of the iliac artery. This incision enables one to reach the ureter in the abdominal portion of its course, or in the upper portion of its pelvic course.

Anatomy of the Cystic Canal.—J. L. Faure, of Paris, ⁷July 8 in a series of drawings, reproduces the outline of forty-two metallic molds of the cystic canal. From these it may be ascertained that the cystic canal is longer than stated in the classics, and that the sinuosities are much more complicated and numerous than is usually believed. Catheterization of the canal is thus an operation which is based upon no fixed laws; one, in fact, in which mere groping is the ruling feature.

SKIN.

The Distribution of Normal Fatty Secretion on the Surface of the Skin.—Arnozan ²⁸⁷Jan. utilized an ingenious method to ascertain the above proposition. A needle is placed in contact with the portion of the skin to be studied, and then dipped into a glassful of water over which small particles of camphor have been strewn. Normally these rotate and move about in every direction. According to the thickness of the layer of fat covering the needle the particles of camphor are suddenly arrested in their motion and as quickly projected toward the edge of the glass, where they remain motionless. The results were the following: The face, hairy scalp, nucha, shoulders, back, the lower part of the chest, and the region of the mons veneris are always covered with a thin layer of fat. The maximum thickness is to be found over the nose and ears, *i.e.*, in proportion with the number of sebaceous glands. In a child 9 months old there was total absence of fat even over the scalp covered with hair. The layer of fat begins to form at about

the sixth year, and increases until puberty, when it is completely developed. It decreases with age, and at 80 years evidence of its presence can only be found over the chin and nose.

PHYSIOLOGY.

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BLOOD.

Genesis of Red and White Corpuscles.—Van der Stricht<sup>356
v.12</sup> communicates an investigation into the origin of the formed elements of the blood, during both intra-uterine and extra-uterine life. In the embryonic period the development of the corpuscles is traced in the germ-layers as well as in the embryonic organs, liver, spleen, etc. With reference to the first appearance of red corpuscles in the early embryonic stages the author concludes that they arise from true mesoblastic cells in the area opaca forming the well-known blood-islands. In the beginning the blood-islands and the forming capillaries and veins contain only red corpuscles; the white corpuscles appear later, developing outside of the capillaries from mesoblastic cells of a peculiar structure which corresponds with that described in later stages as characteristic of leucoblasts. In the embryonic liver the red corpuscles are formed in a similar way from the masses of erythroblastic cells which outline the future capillary system. By the formation of plasma in the interior of these masses the cells come to lie in the cavities of the vessels, and are finally swept off in the stream after connections are made with the main blood-vessels of the embryo. The white corpuscles in the liver are formed in certain areas of leucoblastic cells, which are found chiefly in the cortical layer of the liver, or around the developing blood-vessels. In opposition to the well-known views of Löwit, the author concludes that the parent-cells of the leucocytes, the leucoblasts, multiply by indirect division. The transition of the parent-cells of the red corpuscles, the erythroblasts, to the nucleated red corpuscles of the embryo takes place gradually, the cells acquiring more and more hæmoglobin and the nucleus losing its reticulated structure and becoming more homogeneous. With reference to the loss of the nucleus, in the change from the

(1-1)

nucleated to the non-nucleated corpuscles, Van der Stricht takes side with those who believe that the nucleus is extruded. The extruded nucleus may be recognized lying free in the plasma, and may eventually dissolve there, or, on the other hand, may be ingested and destroyed by the leucocytes, or the giant-cells (megacaryocytes), or the endothelial cells of the blood-vessels. The megacaryocytes, which form such a characteristic histological element of the liver at this time, he believes to be formed from ordinary leucoblasts; they seem to take no direct part in the development of either the red or the white corpuscles, but they fulfill possibly an important function in the hæmatopoietic organs by absorbing the extruded nuclei of the erythroblasts and by forming a supporting reticulum to the hæmatopoietic tissue. In the spleen there is first a period in which the structure of the organ is practically uniform, consisting of a net-work of adenoid tissue containing erythroblasts and leucoblasts in its meshes. Later the leucoblasts become aggregated into the Malpighian corpuscles, and the erythroblasts are found in the spleen-pulp, lying chiefly in the neighborhood of the Malpighian corpuscles. The megacaryocytes are found in the spleen-pulp, and seem to take part in the formation of the adenoid reticulum. In the red marrow of birds Van der Stricht confirms the former discovery of Denys—that the erythroblasts are found in cords or loose strings which form a part of the capillary system of the marrow, the venous capillaries. In the mammal no such definite arrangement of the marrow could be made out, the erythroblasts and leucoblasts being found in the meshes of the lymphoid reticulum.

Volume and Protein Contents of the Red Corpuscles.—Wendelstadt and Bleibtren²⁴⁶_{v.52,p.323} have made determinations of the volume of the red corpuscles and their contents in protein by a new method. The method, briefly stated, consists in determining first the number of red corpuscles in a given specimen of blood, and then the total bulk of corpuscles and the total quantity of nitrogen in this bulk. For the determination of the volume of the mass of corpuscles reference must be made to the original paper, as the process does not admit of a brief description. But, knowing the volume of the whole mass and the number of corpuscles, simple division will give the volume of the single corpuscles, presuming that they are of uniform size. A similar calculation enables them

to get at the nitrogen contents of each corpuscle after the nitrogen of the entire mass has been determined. Their observations were made upon the blood of the pig and horse, and gave them the following results: In the horse's blood the volume determinations of single corpuscles varied from 0.000000037188 to 0.00000004004 cubic millimetres, the average being 0.00000003858. For the pig the limits were 0.00000004144 to 0.0000000457 cubic millimetres, the average being 0.0000000435. The amount of proteid in each red corpuscle of the horse varied between 0.0000000174 and 0.00000001874 milligrammes, average 0.000000018023; for the pig the limits were 0.000000018722 and 0.000000019761 milligrammes, the average being 0.00000001928.

Blood-Plates and Coagulation.—The meaning of the blood-plates has been a subject of discussion from both the morphological and the physiological side. Lilienfeld makes an important contribution to our knowledge of these bodies, ³²⁰_{p. 115} as the result of a series of micro-chemical studies. He finds that when these bodies are subjected to the action of pepsin and hydrochloric acid they become differentiated into a clearer peripheral layer and a granular interior. The former finally disappears and the latter becomes homogeneous, though it resists the digesting action of the pepsin and hydrochloric acid. The application of various tests convinces him that this indigestible residue is composed of nuclein. For instance, it is soluble in concentrated HCl and HNO₃ and in dilute alkalis, and it swells in dilute solutions of soda or phosphate of soda and sodium chloride. He concludes, therefore, that the plates contain nuclein and a proteid, and that it is probable that normally these constituents are combined as a nucleo-albumen. If this conclusion can be accepted it is strong evidence that the blood-plates are not merely precipitates in the blood-plasma, as some have held, but are probably of a nuclear origin. With reference to the last suggestion Lilienfeld calls attention to the fact that the nuclei of the leucocytes behave in exactly the same way to the digesting mixture as the blood-plates, and for this reason he takes side with those who believe that the blood-plates represent the fragmented nuclei of leucocytes that have gone to ground. Furthermore he made cover-glass preparations of the fibrin reticulum, after the manner of Ranvier, and submitted them to pepsin hydrochloric digestion. The result was that the nodal points of the reticulum

behaved like the nuclei of the leucocytes and the blood-plates, and this is strong evidence, taken with what is already known, that these latter elements serve as the starting-points in the deposition of the fibrin net-work. By using differential stains upon similar cover-glass preparations, he asserts that he has been able to follow the fibrin threads directly into the nuclei of the leucocytes wherever the latter bodies happen to be lying in the reticulum.

In a second communication to the Physiological Society of Berlin ³²⁰_{p.467} he develops still further his views as to the connection of the leucocytes with the formation of fibrin. He has been able to extract from leucocytes a nuclein body, rich in phosphorus and soluble in acids, which he calls leuconuclein. Solutions of this leuconuclein behave like strong solutions of fibrin ferment in causing coagulation in salted plasma. He is led, therefore, to support the original view of Schmidt, that the leucocytes are directly connected with the formation of fibrin; but whether the leuconuclein is itself the fibrin ferment, or whether it simply holds the ferment in combination, he leaves undetermined. The full details of his last work will appear later in the *Zeitschrift für physiologische Chemie*.

Glycolysis in the Blood and Lymph.—Sugar added to blood quickly disappears, and the term glycolysis is used to designate this fact. Arthus (ANNUAL, 1892, vol. v, H-42) has given reasons for believing that this action takes place only after blood is shed, and that it is caused by a ferment (glycolytic ferment) developed after the death or disintegration of certain of the formed elements of the blood. In a new paper ⁴¹⁰_{p.337} he gives some additional facts with regard to the conditions controlling this process. He asserts that glycolysis in shed blood is absent, or very feeble, in the first few minutes after bleeding, but increases rapidly in the course of the first hour. Blood, on the other hand, which is rapidly frozen after having been shed, and is kept at 0° C. (32° F.) for forty-eight hours, will, upon warming to 40° C. (104° F.) for three hours, show a greater glycolytic action than a sample of the same blood warmed to 40° C. for three hours immediately after it is taken from the animal. Finally, blood may be completely protected from bacterial action if sodium fluoride be added to it to the strength of 1 per cent. immediately after being shed. Presumably, the sodium fluoride, under these circumstances, destroys all living cells in the blood;

nevertheless, the glycolytic action still takes place. Arthus uses these three observations to show that the glycolysis is not dependent upon the presence of any actually living elements. He believes, as was stated above, that there is a glycolytic ferment, and, like the other unformed ferments its action may be destroyed by heat. Yet, in some respects, this particular ferment differs from the fibrin ferment also found in shed blood, as follows: Exposure to the action of alcohol destroys the glycolytic agent, but, as is well known, has no effect upon the fibrin ferment. Secondly, sodium fluoride, if added to the blood immediately after it is shed, will prevent the formation of the glycolytic ferment; but if added later, after the ferment has formed, does not prevent its specific action on sugar. On the contrary, sodium fluoride does not prevent the development of fibrin ferment. His final conclusion, as in his former papers, is that glycolysis in the blood is not a normal process; that is, does not occur in the circulating blood under normal conditions, but is due to the presence of a soluble ferment formed in the blood after shedding.

Investigations upon a related topic (the diastatic ferments of blood) have been reported by Bial and Röhlmann.²⁴⁶ Bial states that when blood is collected with aseptic precautions, or with the addition of thymol to prevent bacterial action, it still exhibits a diastatic action, and he finds that this action takes place in the serum of the blood only. For if a mass of corpuscles be obtained by centrifugalizing and be thoroughly washed to remove adherent serum, it will no longer show a diastatic action. He makes the very interesting statement that this ferment differs from that of saliva and pancreatic juice, in that it changes starch to dextrose (glucose) and not to maltose, as the digestive ferments do. His proof for this assertion lies in the fact that, after maximal action of the blood on a given amount of starch, the same quantity of reducing sugar is formed as would have been obtained by the action of dilute acids; that is, from one hundred parts of dried starch about 86 per cent. of reducing sugar may be obtained after the action of the diastatic ferment of the blood, whereas the best result from the diastatic ferment of pancreas does not exceed 50 per cent. To supplement this observation, he shows that the blood-ferment, if allowed to act upon maltose or achroödextrin, will convert it into a sugar of greater reducing action, glucose. These

results are very interesting; for, while it has been known of recent years that pytalín and the diastatic ferment of pancreatic juice convert starch into maltose and dextrin, it has also been shown that the sugar found in the blood is glucose. It is quite possible, therefore, if we grant that the diastatic action of the blood is a normal process, that the last step in the conversion is effected through its agency. The view of Arthus, just given, that the glycolytic ferment is a post-mortem product, does not apply, according to Röhlmann, to the diastatic ferment. Röhlmann,²⁴⁶ v. 62, p. 157 endeavors to show that the ferment is normally present in both blood and lymph. His experiments to demonstrate this point consist in injecting glycogen into one of the lymph vessels and then examining lymph taken from a fistula of the thoracic duct. Specimens of the lymph obtained from the fistula were examined for sugar before and after the injection of the glycogen. The result was that in all cases the amount of sugar in the lymph was increased after the injection. Röhlmann's interpretation of the experiments is that the glycogen introduced into the lymph circulation was changed into sugar by a ferment existing in the lymph. If this be true the existence of the same ferment in the blood follows as a matter of high probability.

CO₂ in Peptone Blood.—Blachstein,³²⁰ p. 394, '91 undertakes to find an explanation of the fact discovered by Lahousse, that the CO₂ in the peptonized blood of a dog is less than in the normal blood. He first shows that in the rabbit, in which the injection of peptone is powerless to prevent coagulation, the same disproportion in the quantities of CO₂ gas holds good. To determine whether or not the diminished amount of CO₂ in peptone blood comes from a diminution in the formation of CO₂ in the tissues, examinations were made of this lymph, with the interesting result that in it the quantity of CO₂ was found not to be altered by the peptone injection. The observation seems to show that in the peptonized animal the CO₂ production of the tissues is not lessened. A continuation of these experiments is reported by Grandis,³²⁰ p. 499, '91. In the first place, he attempted to prove, by another method, that the diminished CO₂ of the peptone blood cannot be explained upon the supposition of a decrease in tissue oxidation. For this purpose, he tested the amount of gaseous exchanges in the normal and the peptonized animal. The quotient of the CO₂ in the blood of the peptonized animal into the CO₂ in the blood of the normal animal is about

0.5, but the quotient of the CO_2 eliminated in the lungs of the peptonized into the normal is approximately 1.0. The elimination of CO_2 depends upon the difference in pressure between the CO_2 in the blood and in the alveolar air; and since in the peptonized animal, in spite of the diminished CO_2 of the blood, the pressure in the alveolar air is apparently the same as in the normal, it follows that in the blood of the peptonized animal the tension of the CO_2 must be greater than normal. He demonstrated that this is actually so, by occluding a portion of the lungs in normal and in peptonized animals, until the lung air had the same CO_2 pressure as the venous blood. His result from these experiments was, that in the occluded air of the normal animal the CO_2 pressure reached 4 per cent., while in the peptonized animal it reached 8 per cent., in spite of the smaller quantity of CO_2 in the blood of the latter animal. Direct examination of the tension of CO_2 in normal and in peptonized blood also showed that in the latter it was higher. Examination of the serum of peptonized blood showed that in it, as in the blood itself, the CO_2 contents were lower than in normal serum. The portion of the CO_2 free in the serum was greater than the portion in combination, and was practically equal in amount to the free CO_2 in normal serum; so that the peculiarity of the CO_2 peptonized blood seems to be confined to that portion held in combination rather than the free portion. What the peculiarity is the author leaves unsettled, but suggests that the peptone forms some combination which weakens the basic properties of the blood.

MUSCLE.

Structure of Striated Muscle.—In a recent paper by Haycraft,³⁹¹ v.23,'91 he brings out a novel method of studying the finer structure of the striated muscle-fibre. In former papers he had advocated the view that the cross striation is an optical phenomenon, and is due to the fact that the ultimate fibrils are varicose in structure; a mass of such varicose fibrils will necessarily give cross striations when examined by transmitted light. The interesting proof that he offers for this beaded structure of the fibrils lies in the fact that, by pressing a fibre upon a partially hardened layer of collodion, a perfect impression may be obtained showing the details of structure of the fibre in a most complete manner. To make the print a fine, even layer of collodion is formed on a

glass slide, and, after the material has reached the proper consistency, a few teased muscle-fibres are pressed upon it by the fingertips. When the finger is withdrawn the fibres come away with it, but examination of the collodion layer under the microscope shows that a perfect impress has been made, reproducing the minute structure of the fibrils. The print may be stained like an actual fibre. The impression is not permanent; the subsequent hardening of the collodion again effaces the irregularities in the surface layer to which it is due. The author believes that this experiment gives indisputable evidence of the varicose nature of the fibrils, and confirms his explanation of the origin of the cross striation.

Ewald and Oppenheimer²⁴⁶_{v. 52, p. 186} have repeated this experiment and obtained similar results, but are of the opinion that, in itself, it is not conclusive proof of the varicose character of the fibrils. We may imagine, they say, that a similar imprint would be obtained if the isotropic and anisotropic substances in the fibre were of different degrees of hardness. Firm pressure in that case would cause the harder substance to make the deeper impression, and thus make a print which would not correspond to the actual structure of the fibre. They attempted to prove or disprove Huxley's view by means of an ingenious experiment. Longitudinal sections of muscle were made, and were then silvered so that they transmitted no light, but reflected it from the upper surface when examined under the microscope. When they studied such preparations, by reflected light at different angles, they were able to see clearly that the upper surface was ridged and depressed, as it should have been upon the theory of a varicose structure. By varying the angle of the reflected light, the reflections and shadows changed upon the surface of the section after the manner of a hill illumined by the rising or setting of the sun. The silvered longitudinal sections were re-imbedded and cut longitudinally, so as to obtain a profile section, with the result that the ridges and hollows caused by the varicosities were demonstrated with perfect distinctness. Their results, therefore, confirm the view of Huxley, and leave no room for doubt as to the varicose structure of the muscle-fibril. Ewald does not make any statement of his opinion as to the connection of this structure with the cross striation.

Rhythmic Processes in Neuro-Muscular Apparatus.—Wedensky⁴¹⁰_{p.50} gives, in a short paper, something of a general discussion upon the facts developed in his previous work (*vide* ANNUAL, 1892, vol. v, H-6). In his former papers he has shown that the muscle-tone does not reproduce the rhythm of nervous discharge, but is a transformed and slower rhythm. The transformation is probably brought about by the nerve terminations, since he is convinced that they are the least sensitive to rhythmic response of any of the parts of the neuro-muscular apparatus.

The effect of rate and strength of stimulation of the nerve upon the rhythm of muscular contraction he classifies as follows: When the excitations of the nerve are frequent, but feeble, they are transformed to a smaller number of impulses by the nerve terminations, the reduction being greater the feebler the stimuli. When the excitations of the nerve are strong he distinguishes three effects, according to the rapidity of the rhythm. There is an optimum rate to which the muscle gives the greatest response,—that is, the strongest contraction. This rate is apparently the maximum rhythm of impulse which the muscle can receive without transformation. If the frequency of stimulation passes this limit the muscle responds with a transformed rhythm, and this relationship he designates as subpessimum. With a still greater frequency of nervous discharge,—pessimum rate,—the muscle refuses to respond at all, remaining in a relaxed condition. A further increase of rate beyond the pessimum may lead to a second optimum, with the muscle again contracting. The existence of a pessimum rate, as defined above, is interesting from a theoretical stand-point. Wedensky uses it to explain inhibition. To account for inhibition it is not necessary, in his opinion, to imagine the existence of a separate category of fibres, since an ordinary motor-fibre will effect inhibition when the rapidity of nervous discharge passes a certain limit. He asserts, from his experiments upon the nerve-muscle apparatus, that inhibition from this cause must be accepted as an observed fact. To explain the effect, he supposes that the “electrical waves” conveyed by the nerve in functional activity cause, in the nerve terminations, an electrical change of the nature of electrotonus. Wedensky insists especially that in the nerve-muscle apparatus the difference in responsiveness to rate of stimulation—lability, as he terms it—should be taken into account.

Of the three parts composing the apparatus, the nerve-fibre is the most and the nerve terminations the least labile.

Making and Breaking Contractions of Muscle.—When a muscle is stimulated by induction currents, the breaking shock, as is well known, is usually stronger and gives a stronger contraction than the making shock. Courtade⁴¹⁰_{p.369} states, however, that the reverse may occur under certain conditions, the making contraction being the stronger. The special conditions which lead to the reversal are stated to be (1) the removal of the core from the primary, (2) an increase in the resistance to the induction current, and (3) an increase in electro-motive force in the primary current.

Circulation in Muscle During Functional Activity.—Kaufmann⁴¹⁰_{p.279} has studied the blood-supply of the masseter and levator muscle of the upper lip in horses during physiological activity. The well-known experiments of Ludwig and of Gaskell have made it probable that during activity of the muscles there is an increased blood-supply owing to a vaso-dilatation. But these results were obtained after artificial stimulation of the motor nerves, which would necessarily bring into action all the fibres contained in the nerve-trunks. In natural stimulation, on the contrary, it is quite possible that the motor fibres might act without the vaso-dilators, and *vice versâ*. In Kaufmann's experiment he stimulated the muscles naturally by giving the animals something to eat. The contractions of the muscles were recorded by tambours and the pressure in the artery and vein distributed to the muscles was taken by means of manometers. In some cases the carotid pressure was also determined. He succeeded in showing clearly that during the activity of the muscles there is a marked increase in the blood-supply, which seems to be due, in part, to a local vaso-dilatation, and, in part, to a more rapid beat of the heart. The greater flow of blood through the muscles was observed directly, in some cases, by catching the blood as it flowed from the veins. The manometer records gave distinct evidence of a local dilatation, since the arterial manometer showed a fall and the venous manometer a rise in pressure. The carotid pressure, on the other hand, showed a rise, which resulted from the increased heart-rate. The conditions of high general pressure and low local resistance give, of course, the theoretical requirements for an increased blood-flow. Kaufmann estimates that during action the amount of

blood flowing through the muscle may be five times as great as in the condition of rest. In addition to these facts his records show that with each muscular contraction there was a rhythmic increase in the blood-flow, showing that the mechanical shortening of the fibres acts as a force-pump to drain the blood out of the capillary areas, partly toward the veins and partly, also, toward the arteries. This action, on the whole, also favors the flow of blood through the muscle, since the capillaries would fill up rapidly in between the contractions, and the less resistance was on the venous side.

In a second paper,⁴¹⁰_{p. 495} Kaufmann studied the effect of muscular movements involving many muscles upon general arterial pressure. The animal used was the horse; pressure was measured in the carotid. When the animal was made to walk rapidly there was a distinct acceleration of the heart-beat, together with a decided lowering of blood-pressure. This indicates that the general vaso-dilatation was so great as to overbalance the effect of the increased heart-beat upon the general pressure. This experiment not only gives us a valuable indication of the value of the accelerator apparatus of the heart, but, as the author suggests, it indicates a physiological explanation of the value of training. It may be that in training the power of contraction of the heart-muscles becomes adapted to the circulatory needs of the locomotor system.

Consumption of Sugar by Muscle during Contraction.—In some interesting experiments made upon the muscles of the thigh by Morat and Dufourt,⁴¹⁰_{p. 327} it has been shown that, in the period of rest following strong contraction, the muscle takes from the blood more sugar than it did in the period preceding contraction. Their method of experimenting was to take, simultaneously, samples of blood from the femoral artery and vein, and titrate for sugar. The difference in sugar content between arterial and venous blood gave the amount of sugar which had been consumed in passing through the capillaries of the leg. The circulation in the parts below the knee was cut off by means of an elastic band, so that, practically, their results apply only to the muscles of the thigh. Determinations of sugar in arterial and venous blood were made before and after contractions of the muscles, the contractions being produced by electrical stimulation of the motor nerves. The figures of one of their experiments, which may be taken as an indication of their results, were as follow: Before contraction, the consumption of

sugar for one minute of circulation was 0.53 gramme (8 grains). After strong contractions, carried to the point of complete fatigue, the consumption for the same interval was 1.08 to 5.50 grammes ($16\frac{3}{4}$ grains to $1\frac{1}{4}$ drachms). They assume that the muscle stores up the sugar in the form of glycogen, to replace that used up in the katabolism of contraction.

Action of Glycerin on Muscle.—Langendorff³²⁰_{p.480,91} reports a curious action of glycerin after injection into a frog. If 1.5 to 2 centimetres (25 to 32 minims) of glycerin are injected into the dorsal lymph-sac of a frog an abundant flow of lymph into the sac will result, and in a short time the animal falls into convulsions of a clonic or tetanic character. Langendorff explains the phenomenon by supposing that the withdrawal of water from the tissues acts as a stimulus to both the central and peripheral nervous system. A striking peculiarity of a frog in this condition is that a single stimulus, applied locally to a muscle, arouses a tetanic contraction which spreads to neighboring muscles. The stimulation of the contiguous muscles in this case seems to be due to the action current of the muscle in contraction. Biedermann has shown that a partial drying of a muscle increases its irritability, and the action of the glycerin in this experiment, according to the supposition of Langendorff is to bring about just such a condition.

NERVOUS SYSTEM.

Heat-Production in Nerve-Fibres during Functional Activity.—Stewart¹⁷⁸_{v.12,p.409} has attempted a re-investigation of the subject of heat-production in nerve-fibres during functional activity. He experimented upon mammalian nerves, and employed the resistance-thermometer described by Rolleston (ANNUAL, 1891, vol. v, II-18). The principle of the thermometer lies in the fact that the resistance of a platinum-wire varies approximately with its temperature. Stewart has devised electrodes, with small coils of platinum-wire, which may be balanced against each other through a Wheatstone bridge arrangement. The most sensitive of these thermometer electrodes which he employed was estimated to reveal a difference in temperature of $\frac{1}{2000}^{\circ}$ C. His experiments upon the mammalian nerve, like those of Rolleston upon the frog's nerve, gave only negative results, so far as a production of heat during functional activity is concerned. Stewart, however, is not inclined to

admit that this negative testimony is sufficient to justify the belief that no heat is produced. Considerations based upon the physical structure of the nerve-trunks influence him to believe that heat-production in the axis-cylinders may occur during the transmission of an impulse, and yet be insufficient to raise perceptibly the temperature of the nerve-trunk. From measurements made upon the roots of a spinal nerve, he estimates that the total area of the combined axis-cylinders is only about one twenty-fifth of that of the entire trunk. The material of the axis-cylinder forms, then, only a small portion of the nerve, and, taking into account the large amount of inactive material in the nerve-trunk (and the poor conductivity of the myelin material), he believes that a rise of temperature of as much as $\frac{1}{200}^{\circ}$ C. in the axis-cylinders would not necessarily raise the temperature of the trunk $\frac{1}{2000}^{\circ}$ C., which was the limit of delicacy of his thermometrical apparatus. Stewart was not able to corroborate Rolleston's observation of a distinct rise of temperature in the nerves while dying.

Fatigue in Nerve-Fibres.—Making use of the capillary electrometer, Edes¹⁷⁸_{p.431} has studied the effect of long-continued stimulation on the action current of medullated fibres. A muscle-nerve preparation from a frog was used in his experiments, and was arranged in a moist chamber in such a way that not only the action current could be obtained with the capillary electrometer, but the muscle-contractions could be recorded as well. The strength of the action-current was measured by the extent of excursion of the mercury in the electrometer. He found that, after five hours' continuous stimulation, the action-current remained practically undiminished in strength. In an addendum to the paper, the author gives the results of a number of histological observations made to determine whether or not Frohmann's striations are to be found in a nerve after continued stimulation. His results were not perfectly constant, but, on the whole, he feels justified in making the statement that the passage of the current through the nerve "made some slight difference in the behavior of the nerve-fibre toward staining with nitrate of silver." Frohmann's striations were obtained from the stimulated fibres; so that his observations disprove the previous statement, that the exhausted nerve-fibre differs from the unstimulated fibre in not showing these striations.

Action of Ether, Chloroform, and Alcohol on the Conductivity of Nerves.—Perles and Sachs ²⁴⁶_{v.52,p.628} have found that the transmission of a nerve-impulse may be blocked, in sensory and motor fibres, by the local application of ether, chloroform, and alcohol. The peripheral action of ether on motor nerves was shown some years ago by Bowditch, a fact which seems to have been unknown to the authors of the present paper. Perles and Sachs arranged an ingenious chamber, made of rubber tubing, which inclosed the nerve at a given spot. Through this chamber the vapor of ether, chloroform, or alcohol could be blown so as to affect the nerves only at the point inclosed. The conductivity of the nerve could be suspended in this way with perfect ease, and without any apparent injury, since, by replacing the ether-vapor with air, the conductivity was again restored. They found, moreover, that not only the nerve-impulse, but the negative variation as well, was blocked at the spot anæsthetized, thus giving a new proof of the close connection, if not identity, of these two changes in the nerve-fibre during activity.

Comparative operations on the motor and sensory fibres in the sciatic during the action of ether, etc., showed that the sensory fibres lost their conductivity before the motor fibres, thus corroborating earlier observations of Kronecker. In other experiments, made upon large frogs, the sciatic was cut above the knee and removed, together with the two roots, anterior and posterior, connecting it with the cord. The anterior and posterior roots were connected with a galvanometer, the sciatic was blocked somewhere in the middle of its course by ether, and a stimulus was applied to the peripheral side of the anæsthetized spot. They found, by this method, that the action of the ether upon the motor and sensory fibres was practically the same; that is, the negative variation in the two roots disappeared practically simultaneously as the ether-vapor took effect. This result does not correspond with the former one, in which the motor effect was determined by stimulation on the central side of the spot anæsthetized, and the sensory effect from the reflex movements after stimulation on the peripheral side of the block. They, therefore, to reconcile these two results, suppose that, in the course of the action of the ether on the fibre, there is a time when the conductivity is so far suspended that the impulse, though partially blocked, gets through with sufficient strength

to give an effect upon a muscle, but not upon a galvanometer, the muscle as an indicator being the more sensitive of the two.

Physiological Anatomy of Sympathetic Nerve-Fibres.—Langley, ²¹⁴¹_{v.183,p.85} in a recent paper, gives a careful account of the origin from the spinal cord of the cervical and upper thoracic sympathetic fibres, together with some observations on the composition of the gray and white rami communicantes. He attempts to trace the place of emergence from the cord, first, of the fibres causing dilatation of the pupil, opening of the eyelids, and retraction of the nictitating membrane; second, of the vaso-constrictor and vaso-dilator fibres distributed to the head; third, of the secretory fibres of the salivary glands; fourth, of the accelerator fibres to the heart. The method used for tracing the fibres was physiological. The animal was anaesthetized, and the various spinal nerve-roots, or rami communicantes, were exposed and stimulated. An account of experiments made upon each of the physiological varieties of fibres mentioned above is given in the paper in tabulated form, and is preceded by a useful and convenient summary of the work of previous experimenters upon the same nerve, also given in the form of tables which admit of easy comparison of the results of different workers. The main results obtained by Langley are as follow: The fibres to the pupil, eyelid, and nictitating membrane emerge from the first, second, and third thoracic nerves. The author lays special stress upon the fact that none of these fibres come out of the eighth cervical, as has been stated by previous observers. The vaso-constrictor fibres to the head emerge, in the cat and dog, from the first, second, third, fourth, and fifth thoracic nerves. He was not able to demonstrate a vaso-dilator action in any of these roots. In rabbits the vaso-motors come out somewhat lower down, the area extending from the second to the eighth thoracic nerve. The secretory fibres to the submaxillary gland of the cat and dog emerge from the second, third, fourth, and fifth thoracic nerves, accompanying closely the vaso-constrictor fibres. The accelerator fibres of the heart were worked out only in the cat; they were found in the second, third, fourth, and fifth thoracic nerves, corresponding in their exit, therefore, with the vaso-constrictor fibres. For each kind of fibre there was a spinal nerve in which the maximum outflow occurred, and the particular nerve in which this happened varied to a certain extent with the kind of fibre. Stimula-

tion of the first thoracic gave the maximal effect for the pupil; the second thoracic for the eye-secretion, sometimes for accelerators and sometimes for the vaso-constrictors of the head; the third thoracic for the vaso-constrictors of the head and sometimes for the accelerators of the heart; the fifth thoracic for the hairs of the face and neck (pilo-motor fibres); the sixth thoracic for the hair of face and neck; the seventh thoracic for the sweat-glands of the fore-feet.

In addition to these observations, Langley gives a special description of the composition of the rami communicantes from work done chiefly on the cat and dog. The typical ramus contains both a white and gray portion, though in a number the white is absent. Langley, unlike Gaskell, finds that the uppermost white ramus comes off from the first thoracic nerve and the lowermost from the fourth lumbar. Above and below these points only gray rami are found. The gray rami, however, do not consist entirely of non-medullated fibres. A small number of medullated fibres, with diameters varying from $3\ \mu$ to $12\ \mu$, may also be found in them. Langley attempts to determine whether these latter fibres are afferent by the following experiments: Stimulation of the central end of the cut rami gave him no indication of afferent effects, either in the way of motor or vaso-motor reflexes. On the contrary, stimulation of the central end of the white rami gave distinct reflex movements and a rise in blood-pressure. In spite of this negative result, Langley is inclined to believe that the medullated fibres, found in the gray rami, are afferent in function, and the failure to obtain an effect upon stimulation was due either to the small number of them in each ramus or because they are "fibres of some special sense, or subserve local visceral reflexes which escape attention." Edgeworth¹⁷⁸_{v.13,p.260} reports a similar investigation into the distribution of the sensory fibres to the abdominal and thoracic viscera. He endeavors to trace out completely the course of certain large medullated fibres, having a diameter of from $7.2\ \mu$ to $9\ \mu$, which Gaskell had previously described as occurring in the splanchnics and the efferent branches from the semi-lunar ganglion. The investigation was entirely histological, and it is impossible to give an adequate account of the results in a short abstract. The main facts recorded are as follow: The large medullated fibres, to which he gives the unfortunate name of large

sympathetic fibres, enter the sympathetic chain in the rami communicantes of the first dorsal to the third lumbar nerve inclusive; similar fibres are found in the cardiac branches from the annulus of Vieussens and from the vagus, as well as in the depressor nerve. In the branches distributed to the lungs similar fibres occur, which seem to be derived in part from the vagus and in part from the vagus through the annulus of Vieussens. As for the pelvic viscera, a double supply of large sympathetic fibres is described—part of them coming from the sacral nerves, and part from the upper lumbar and lower dorsal nerves through the hypogastric. By the method of serial sections the large medullated fibres were traced backward in some cases through the rami and into the posterior roots, thus giving histological evidence of their afferent nature. On the other hand, no connection could be demonstrated between these fibres and the cells of the sympathetic or collateral ganglia. The investigation discloses a nervous mechanism, by means of which afferent impulses may pass from the viscera to the central nervous system. Apparently the sensory fibres go directly from the cords to their peripheral terminations without making connections with any of the outlying ganglion cells. Within the cord these fibres cannot be traced by histological methods. The author calls attention to the fact that their emergence from the cord corresponds to the limits of Clarke's column, and hazards the hypothesis that their central connections are with these cells. If such a connection could be demonstrated it would throw light on the physiological value of the direct cerebellar tract in the cord, inasmuch as the fibres of this tract connect the cells of Clarke's column with the cerebellum.

Action of Nicotin on Ciliary Ganglion and Third Nerve.—Langley and Anderson,¹⁷⁸_{v.13,p.460} make use of the action of nicotin to prove certain points in the distribution of fibres from the ciliary ganglion. In previous papers Langley has given reasons for believing that the application of nicotin to a sympathetic ganglion paralyzes the cells, but does not affect the efferent fibres from the cells to the tissues. The authors use this method upon the ciliary ganglion. They find that, after painting their ganglion with the nicotin solution, or injecting 10 milligrammes into the blood, stimulation of the third nerve gives none of its usual effects upon the eye; there is no contraction of the pupil, of the ciliary muscles,

of the muscles of the eyeball, or of the levator palpebrarum. If, however, under these conditions, the electrodes are applied to the short ciliary nerves emerging from the ganglion, contractions of the ciliary muscle and the sphincter iridis are readily obtained. In the light of their interpretation of the action of nicotin, these results mean that the fibres innervating these last two muscles pass from the third nerve into the ciliary ganglion and thence into the short ciliary nerves. If we accept their premises, the experiment also gives physiological evidence that the ciliary ganglion belongs to the type of sympathetic rather than to the type of spinal ganglia. In the experiment related above it is stated that the nicotin paralyzes the action of the third nerve on the muscles of the eyeball and the levator palpebrarum. Moreover, stimulation of the fourth and sixth nerves, after the use of nicotin, causes no contraction of the corresponding eye-muscles. Since the application of the electrodes directly to the same muscles gives contractions without difficulty, it would seem that the nicotin paralyzes the endings of the nerves in the muscles. By increasing the dosage of nicotin, the paralyzing action may be extended to other muscles in the body. The order in which the action of the nicotin manifests itself is classified by the authors as follows:

1. The nerve-cells of the ciliary ganglion in the course of the nerve-fibres to the sphincter iridis and (probably) ciliary muscle.
2. Nerve-cells of the superior cervical ganglion in the course of the nerve-fibres which cause dilatation of the pupil.
3. Nerve-endings of the third, fourth, and sixth nerves in the extrinsic muscles of the eye. The nerve-endings of the third nerve in the elevator of the eyelid and the nerve-endings in the muscle causing protrusion of the nictitating membrane are paralyzed a little less readily than those in the extrinsic muscles of the eye.
4. Nerve-endings in the muscles supplied by the fifth and seventh nerves.

About the same time as these all the nerve-endings in the skeletal muscles of the body are paralyzed.

Removal of Cerebrum in Dog.—Goltz's seventh communication ²¹⁶ upon the physiology of the cerebrum is, in some respects, the most interesting of all, as he has succeeded at last in removing the entire cerebrum without killing the dog. In the most successful experiment the animal was kept alive for eighteen and one-half months, and post-mortem examination showed that all the

cortex had been removed, except from a small portion of the basal surface of the tip of the temporal lobe. In addition to the cortical lesion, a large part of the corpora striata and thalami and a small part of the mid-brain had been destroyed. The small remnant of the temporal cortex not actually destroyed was, of course, practically removed, since all its peripheral connections had been interrupted. Goltz made a number of careful observations upon the behavior of this animal, to discover its physical and psychical defects. The dog slept naturally, and could be awakened by loud noises or by handling. He showed an inclination to keep constantly in motion, bearing usually toward the right, though a slight pressure of the hand was sufficient to guide him either way. Strong, painful stimulation of the skin might cause him to bark, or growl, or even to snap. In making this last movement he turned in the proper direction, to left or to right, though he did not distinctly bite at the point stimulated. He was able to maintain his equilibrium properly when one foot was placed upon a falling door. He was able also to move around upon three legs. No caresses could arouse signs of pleasure, nor threats any signs of fear. With reference to his visual sensations, it could only be said that he closed his eyes when a bright light was thrown upon them, showing that there was not complete blindness. On the other hand, it could not be determined that his movements were guided at all by visual impressions. At first, it was necessary to feed him by placing food directly into his pharynx, but, later, he learned to eat and drink, provided his nose was brought into contact with the food, though he was never able to recognize food simply brought near to him. He still had some sensations of taste, since he invariably rejected food moistened with quinine after chewing it for a while. The removal of the cerebrum was accomplished in three operations, and, after the second one, certain trophic disturbances were manifested, chiefly in the hind limbs. It was found necessary, in order to control this malnutrition, to give him excessive amounts of food. Goltz states, as two of his most suggestive observations, that the animal showed signs of hunger and thirst, and, on the other hand, gave no evidence of dreaming while asleep, as the uninjured animals often do in the clearest way. The hunger and thirst became manifest when the dog was deprived of food for some time, the uneasiness of his movements indicating clearly the

existence of these sensations. If, while in this condition, food were given to him, the eagerness with which he took it was also a proof of the existence of hunger sensations. Goltz uses this extraordinary experiment to support his views of the physiological value of the cerebrum, and to combat the modern views of localization. He compares the behavior of his dog with that of the pigeons of Schrader and the fishes of Steiner, in which the cerebral hemispheres were also completely removed. The phenomena exhibited by the three classes of animals are in many respects so similar that he is led to believe that the mechanism of the cord and portions of the brain posterior to the cerebrum are approximately identical in all (higher) vertebrates. As for the function of the central hemispheres themselves, he makes chiefly negative statements. He denies the existence of definite motor or sensory areas in the cerebrum. His dog without a cerebrum, compared with a normal animal, showed defects only in the manifestation of intelligence, memory, reflection (*ueberlegung*), and understanding,—that is, in what are sometimes called the higher psychical functions.

Visual Area of Cortex.—Donaldson²⁶³_{No. 4} reports a series of very careful measurements of the thickness of the cortex in the occipital region, in the case of Laura Bridgman. It will be remembered that Laura Bridgman lost vision in the left eye at the age of 2 years, while in the right side vision was retained until the eighth year. Donaldson's measurements showed that the cortex in the right side was thinner, and he therefore made a detailed examination of the two sides for the purpose of delimiting the visual centres, acting upon the assumption that the thinning of the cortex was due to arrested development, and that the cortex would show a greater reduction upon the side opposite to the eye and nerve most affected. His data enable him to outline the visual centre as follows: "Commencing where the cephalic stipe of the interparietal sulcus cuts the mantle edge, and passing latero-cephalad along the latter to its junction with the inferior retro-central sulcus, the boundary then takes the shortest line to the ascending ramus of the first temporal sulcus, following this to its union with the sulcus; from here the shortest line to the lateral occipital sulcus, from the mesial end of which an arbitrary line turns toward the fourth temporal sulcus; running parallel to this sulcus it cuts the gyrus lingualis so as to leave the ventral third of this latter in con-

nection with the fourth temporal sulcus, and continues to a point just ventrad of the cephalic end of the calcarine fissure, which it joins by an arbitrary line running dorsad; it then passes caudad along the calcarine fissure to the junction of the same with the parieto-occipital sulcus, and finally along this sulcus to the mantle edge—then cephalad along the latter to the point of departure."

Cortical Centres for Vagina.—Bechterew and Mislawsky³²⁰_{p.380, '91} have attempted to locate the centre controlling the movements of the vagina. The animals experimented upon were dogs and rabbits, and the movements of the vagina were recorded by introducing a small balloon which was connected with a water manometer. The movements of the column of liquid in the manometer were recorded by a connected tambour instead of a float and pen. The cortical areas, stimulation of which gave contractions or inhibitions of the vaginal musculature were located in the rabbit in the anterior portion of the motor area, and in the dog chiefly in the sigmoid gyrus. The motor and inhibitory centres were not sharply separated; on the contrary, there was a distinct overlapping. In the optic thalami, also, stimulation revealed both motor and inhibitory centres, whereas stimulation of the corpora striata gave negative results. Stimulation of the medulla caused powerful contraction. With reference to the peripheral nerves through which the motor and inhibitory fibres pass, they found that stimulation of the peripheral end of the splanchnic caused contractions of the vagina, and of the peripheral end of the vagus inhibition of the same. Contractions were also produced by stimulation of the central end of the vagus and other sensory nerves. The authors believe that the higher centres which they have discovered are automatic in action and control the vagina through local centres in that organ.

Central Nervous System of Amphioxus.—Danilewsky²⁴⁶_{v.52, p.393} relates some interesting experiments made upon the amphioxus, which form a suggestive contribution to the comparative physiology of the nervous system. The animal was divided with sharp scissors into two halves, or into a shorter anterior and longer posterior portion. In other experiments only the nerve-cord was cut in such a way that the anterior end, corresponding in position to a brain, was divided off from the posterior end. The results in all cases were uniform. The portion containing the so-called brain

showed distinct signs of voluntary movements, while the posterior portion remained passive unless stimulated. The reflexes from the anterior end differed also from those given by the posterior end, in that they lasted for a longer time. The paper is interesting because it shows that this low in the vertebrate scale there is a concentration or development of will-power in the anterior end of the nerve-cord, although no noteworthy morphological differentiation is present.

CIRCULATION.

Cardio-Pneumatic Movements.—Haycraft and Edes¹⁷⁸_{v.12,p.426} bring forward a new explanation of the cardio-pneumatic movements. We mean by cardio-pneumatic movements those slight, inspiratory and expiratory puffs which may be observed with the glottis open and respiratory movement suspended. Hitherto, the apparently sufficient explanation which has been offered is that the enlargement of the heart in diastole forces air out of the chest-cavity, while the diminution in systole has the reverse effect. Haycraft and Edie point out certain theoretical objections to this explanation, and in addition make the fatal practical objection that the movements may be obtained when the chest-cavity is open. They suggest, therefore, that the real cause of the phenomenon lies in the fact that the lungs press closely upon the heart, partly surrounding it, and act as an oncometer to it. Contraction or dilatation of the heart will cause directly a corresponding expansion or contraction of the lungs, which will be felt naturally in the large air-passages. In partial proof of this explanation, they found that simply lifting the heart away from the lungs nearly completely abolished the cardio-pneumatic movements. The remnant of movement that remained in this case finds its explanation in the alternate filling and emptying of the pulmonary vessels with each heart-beat. By comparison of a cardio-pneumatic tracing with a cardiogram of the apex-beat they find that in the curve of the former there is, at the beginning of systole, first, a slight expiratory movement due to the heart asserting itself against the pressure of the soft lungs as it passes from the flabby condition of diastole into the rigidity of systole, and this is followed by a more pronounced inspiratory movement, owing to the diminution in size of the heart after it passes into full systole.

Interpretation of the Cardiogram.—Haycraft¹⁷⁸_{v.12,p.436} gives an

account of experiments made to determine the variations in size and shape of the heart during systole and diastole. His results are quite different from those hitherto published, and, if demonstrated to be correct, will overthrow entirely the current interpretations of the cardiographic curve. His first observations were made upon the frog's heart. To measure its variations in shape and size, he used an instrument which he calls a cardioscope. It consists essentially of a telescope with an eye-piece ruled in squares. The image of the heart was thrown upon the squares, and making use of a piece of paper, also ruled in squares, the position of any point of the heart could be dotted down at the end of systole or diastole. After determining the position of a number of such points they could be connected, and would thus furnish an outline of the shape of the heart at any given period in the cardiac cycle, and as viewed from the sides or front. The curves that he obtained in this way showed that the heart increases in all dimensions during diastole, and decreases in all dimensions during systole. He next studied the movements of the frog's heart as recorded by levers resting directly upon the surface of the ventricle. As is well known, the usual curve obtained in this way shows an up-stroke during the systole, but if, during systole, there is really a diminution in the size of the heart in all axes, then the lever should fall instead of rising. Haycraft affirms that if the lever used is delicately counterpoised, so as not to weight the heart, the curve will show a down-stroke during systole. The usual curve is erroneous because the lever presses into the heart, and, as the latter becomes rigid in systole, it throws up the lever. Finally, he attempts to study the movements of the mammalian heart in the same way. His results are what might be expected from his previous work upon the frog's heart.

His important experiments were made upon the heart in the unopened chest. In some cases he used needles, which were run through the chest-wall into the heart-muscle. The movements of the needles showed, as is usually stated, that the base moves toward the apex, and the latter shows little if any change in position. On the contrary, the movement of the heart-apex toward the right, which is seen so distinctly in the open chest, did not show itself in the movements of the needles. If the needles were passed from the sides, so as to lie between the heart and the sternum, he got

indications of a movement of the heart's surface toward the sternum during diastole and away from it during systole, the latter showing therefore a diminution in the dorso-ventral axis during systole. Simultaneous tracings were taken of the carotid pulse, the cardio-pneumatic movements, and the apex-beat. The carotid (sphygmographic) tracing was used to determine the beginning and ending of the heart-beat, and, by making due allowance for the time of transmission of the pulse-wave, he arrives at the conclusion that in an ordinary cardiogram the first up-stroke represents the beginning of systole only, and that toward the end of systole the wave falls, as it should do if the heart diminishes in size. If this interpretation be correct, then the cardiogram has hitherto been erroneously explained. His final conclusion is expressed in the following words: "During diastole the lever ascends, descending during systole (as the front to back diameter of the heart lessens); at the commencement of systole, however, is an insignificant rise due to the 'assertion' of the heart against the chest-wall. The ordinary cardiograph has a button, and this, pressing into the interspace, presses upon the heart in diastole, when it is flaccid; during systole this is violently thrown off, giving a marked up-stroke, which, however, is due to the unnatural condition of the experiment. Remove this button, and we obtain a true cardiogram showing ascent of the lever during diastole and fall of the lever during systole."

Innervation of Mammalian Heart.—From an experimental study of the action of the vagus and accelerator nerves upon the dog's heart, Bayliss and Starling¹⁷⁸_{v.13,p.407} come to the conclusion that these nerves in the mammal have the same variety of influence as has been described in the frog. In their experiments the contractions of auricles as well as ventricles were registered by tambour arrangements. They found that stimulation of the vagus caused, or might cause, a diminution both in rate and force of heart-beat, while the accelerators gave both an acceleration and augmentation, and in many cases these effects might come out separately. In many cases the depressing or augmenting action or force, or rhythm, was seen to appear most clearly in the auricles, indicating that this portion of the heart is most directly under the control of the regulating nerves. The most interesting experiments in the paper are those bearing upon the conduction of the

exciting impulse over the auriculo-ventricular groove. They bring forward certain facts to show that stimulation of the vagus diminishes the conductivity of this portion of the heart so that the ventricular contractions follow the auricular less readily than under normal conditions. Stimulation of the accelerators, on the other hand, increases the conductivity of this area. They obtained such effects most clearly when an artificial rhythm had been produced by electrical excitation. If, for example, the auricles are stimulated three to four times a second the rhythm is usually communicated to the ventricles, but if the vagus is stimulated at the same time with a weak current the ventricle may drop every other beat. On the other hand, if by clamping the auriculo-ventricular groove the conductivity of this portion is diminished, artificial stimulation of the ventricles so as to produce a reversed rhythm may result in the auricles following the ventricles imperfectly or not at all. If, however, the accelerators are stimulated simultaneously, the ventriculo-auricular rhythm may be produced as easily as in a heart in which the auriculo-ventricular groove has not been compressed. The stimulation of the accelerators seems to remove the block caused by the pressure.

Influence of Temperature and Pressure on the Heart.—Stewart¹⁷⁸_{v.13,p.59} contributes an elaborate paper on the effect of variations in temperature and endocardial pressure on the heart, especially in its relation to the vagus and accelerator nerves. The paper is long, with many details of experiments and results; so that only the main conclusions can be noticed. The experiments were made upon the frog's heart. The heart was immersed in a small vessel of normal saline, the temperature of which could be raised or lowered at will. A clamp was placed at the auriculo-ventricular groove, after the method employed by Gaskell, and the contractions of both auricles and ventricle were recorded. With reference to the "primary inhibitory effects of stimulation of the vagus," he found that, in every case, raising the temperature of the heart increased the action of the vagus, and lowering the temperature had the reverse effect. A lower limit of temperature was found, at or near 0° C. (32° F.), at which stimulation of the vagus had no effect, although, in some cases, application of the electrodes directly to the sinus gave inhibition when stimulation of the vagus itself was ineffective. On the other hand, the effect of vagus stimulation at

high temperatures was not lost as long as the heart beat at all. In fact, when the heat was so great that the heart had come to a heat standstill, stimulation of the vago-sympathetic trunk might call out a series of contractions. The apparent explanation of this result is, that at the high temperature sufficient to produce standstill both inhibiting and augmenting fibres were still active, but only the action of the latter could show itself on the heart, inasmuch as it had ceased beating. The action of heat and cold on the sympathetic (augmentor) fibres was practically the same as that described for the inhibiting fibres, although, on the whole, the sympathetic fibres seemed to be more sensitive to temperature effects. When the heart is raised to a certain temperature, it goes into standstill, and this condition comes on with the heart in diastole. Moreover, the standstill shows in the ventricle before the auricle, or "varies inversely with the rhythmic power of the muscle." Experiments made upon the standstill of cilia at high temperature convinced him that, in this tissue also the cilia stop in the relaxed condition, and that, generally speaking, heat standstill "is a paresis, and not a tetanus." With reference to the effect of variations in endo-cardiac pressure, he found that increase of pressure to a point sufficient to abolish the action of the inhibitory fibres had no effect upon the action of the sympathetic fibres. Under this condition of high endo-cardiac pressure, he noticed also that the accelerating action of the sympathetic was accompanied by a lengthening of the systole. Experiments made to determine the effect of high temperatures and endo-cardiac pressure upon the electro-motive properties of the heart gave unsatisfactory or negative results.

Vaso-motor Nerves to the Eye.—Morat and Doyon⁴¹⁰_{p. 60} state that in dogs and cats the cervical sympathetic contains vaso-dilator fibres for the retina. In rabbits, on the contrary, stimulation of the same nerve causes vaso-constriction in the retina. They explain the difference by supposing that the nerve contains vaso-constrictors and vaso-dilators in all cases, but that the former predominate in the rabbit, and the latter in the dog and cat. They state, moreover, that stimulation of the sympathetic in the upper thoracic region of the rabbit causes a vaso-dilatation of the retina, the reverse of the effect obtained from stimulation in the cervical region. They seem to derive from this experiment the general con-

clusion that the sympathetic ganglia may act as inhibitory centres, an inference which it is difficult to admit on the strength of the experiment quoted. From the results of their numerous experiments, they make the following general statement with reference to the distribution of vascular nerves to the eye: The vaso-motor fibres of the eye are found exclusively in the sympathetic and trigeminal. The former conveys both constrictor and dilator fibres to the posterior of the eyeball. The trigeminal appears to contain dilator fibres only, which are distributed both to the anterior and posterior segments of the eye.

The Portal Vascular System.—In a previous paper noticed in the ANNUAL of 1891 (vol. v, H-29), Moll demonstrated the existence of vaso-motor fibres distributed to the portal system. The significant experiment was, that when the aorta is closed high in the thoracic cavity stimulation of the splanchnics will cause a rise of blood-pressure in the carotid. More exact observations^{320 p. 469} show that closure of the aorta causes in itself, at first, a rise in carotid pressure, followed by a fall and then a second rise. If, at any time in this period, however, the splanchnics are stimulated, an important additional rise of pressure in the carotid will result. The obvious explanation of the experiment is that a vaso-constriction of the vessels of the splanchnic area is produced, which drives a quantity of blood into the right heart, and thence into the carotid and subclavian circulations, which are still open. Moll made a number of experiments to determine the amount of blood which could be driven out of the portal area as a result of stimulation of the splanchnics. His results, though not uniform, show that from 3 to 27 per cent. of the whole quantity of blood in the animal may be forced from this area; the maximum figure falls in well with our knowledge of the great richness of this area, as shown, for instance, by the fall of pressure which results from section of the splanchnics. Moll found that all three of the splanchnics in the dog gave a rise of carotid pressure upon stimulation and after closure of the aorta, and that, apparently, the distribution of vaso-constrictors in the three nerves showed individual variations, although, as a rule, the greatest effect was obtained from the splanchnicus major. Moll attempted to show, also, that the distribution of vaso-constrictor fibres is not confined to the splanchnic veins, but exists over the body at large. For instance, he found that if the splanchnics are

cut and the aorta closed high in the chest, stimulation of the spinal cord will force blood into the right side of the heart and raise the carotid pressure; or, to vary the experiment, if after closure of the aorta and section of the splanchnics the central ends of the latter nerves are stimulated, the same result will ensue, apparently from a reflex stimulation of the systemic veins; although, of course, the phenomenon may be explained in other ways.

RESPIRATION.

Respiratory Centre in Man.—Kehrer^{v. 28, p. 391, 400} records a unique case of vivisection upon a human infant, which seemed to show that the so-called respiratory centre has the same position in the human being as in the lower mammals. It happened that in the birth of a child it was necessary to puncture the cranium and remove the brain. After delivery, however, the child began to breathe, and examination of the brain showed that the medulla was uninjured. Two successive sections of the medulla were then made with scissors. The first cut was posterior to the middle of the calamus scriptorius, and failed to stop the breathing movements. A second cut was made at the posterior end of the calamus, and immediately stopped the respirations. The author believes that the experiments tend to disprove Langendorff's theory of automatic spinal respiratory centres. Langendorff holds that section of the medulla through the respiratory centre is fatal, usually because it acts as a long-lasting inhibition of the true respiratory centres placed lower down in the cord. If the inhibiting fibres which are stimulated, upon this hypothesis, arise from the higher portions of the brain, then the first of Kehrer's sections should have had the same effect as the second.

Reptilian Respiration.—Langendorff,^{p. 320, 486, 491} in a paper upon this subject, gives a number of respiratory curves from lizards, turtles, and snakes. He states that in lizards the cord may be cut below the medulla without destroying normal respiratory movements. They cease for a time, but begin again spontaneously and continue for hours. He considers this experiment as a new demonstration of the existence of automatic spinal respiratory centres.

Cheyne-Stokes Respiration.—In a second paper,^{p. 320, 494, 491} Langendorff states that in young kittens under chloral spontaneous breathing will continue after section of the brain at the level of

the pons, provided that artificial respiration is kept up until the shock passes off. If a kitten has been brought into this condition of spinal breathing, section of the two vagi will cause the respiratory movements to take on a periodic grouping resembling the well-known Cheyne-Stokes respirations. He lays emphasis upon the experiment as disproving the influence of the impulses arising in the lungs in causing this particular form of respiratory discharge.

Expiratory Movements of Frogs.—In a former paper Langendorff has shown that in the breathing of normal frogs the expiration is caused chiefly by the sudden collapse of the lungs consequent upon the opening of the glottis, the former view having been that the lungs were compressed by the contraction of the flank muscles. In a new communication ³²⁰_{p.494,'91} he shows that, in addition to the collapse of the lungs, there is an active expiratory contraction of the flank-muscles. He proves this point by removing the lungs, in which case expiratory movements of the flanks continue, though not so conspicuous as in the normal animal.

Respiratory Changes in Intra-thoracic Pressure.—Meltzer reports ¹⁷⁸_{v.13, p. 218} a number of experiments upon the variations in intra-thoracic pressure during breathing, in the different portions of the thoracic cavity. The intra-thoracic pressure was measured in the posterior mediastinum, and to reach this space a stout catheter was forced through the loose areolar tissue along the œsophagus until it reached the thoracic cavity. By moving the catheter to different depths in the thoracic cavity, it was possible to ascertain any local differences that might exist in the thoracic pressure. The main object in investigating this point was to obtain some definite idea as to the relative expansion of the upper and lower portions of the lungs. The experiments were made upon rabbits, and records of the variations in pressure were obtained by means of a tambour connected with the catheter. The results were not perfectly satisfactory, but, on the whole, Meltzer is convinced that in the upper portions of the thorax, above the fourth rib, the change of pressure during inspiration is very small, while below this level the respiratory undulations are sudden and marked in extent. The apparent conclusion to be drawn from this result is, that most of the inspiratory increase in capacity falls in the middle and lower portions of the lungs, the apices remaining compara-

tively unexpanded. The author admits that this conclusion needs further corroboration before it can be applied to the etiology of lung diseases.

DIGESTION AND NUTRITION.

Reactions of Unformed Ferments.—In a paper upon the peculiarities of the unorganized ferments, Tamman⁸³_{v.16,p.271} summarizes the reactions which have been recorded from time to time, and adds some new ones. He especially compares the behavior of these ferments with that of acids known to have a hydrolytic action. It should be stated that by hydrolysis is meant the property that certain substances possess of splitting up into simpler bodies upon the absorption of water into the molecule. As is well known, the special action of many of the unorganized ferments, particularly the digestive ferments, is explained upon the supposition that they act as hydrolytic agents, conveying water to the molecule of the substance affected by the digestion. When the hydrolytic action of the ferment is compared with that of acids, the following differences may be noted: The action of acids is more universal, while that of ferments is restricted to certain substances. If any given hydrolysis is hastened by an acid, other acids will have the same effect. The ferments, on the contrary, each show an action more or less peculiar to itself. The reactions caused by the ferments are also, as a rule, more incomplete than those caused by acids; the ferment during the process of its acting seemingly becomes converted to an inactive modification. The inactive modification is produced apparently by the products of hydrolysis, *e.g.*, the effect of the presence of peptones on the activity of pepsin. The activity of the ferment, under the conditions last mentioned, may be restored in part by dilution or by warming, although in the latter case there is naturally a limit to which the temperature may be raised with advantage.

Gastric Juice and Peptic Digestion.—Contejean⁴¹⁰_{p.259} gives a simple and apparently new method of demonstrating that the normal acid of gastric juice is HCl. The method is as follows: A freshly-prepared precipitate of cobalt hydrocarbonate is rubbed up with the gastric juice; the juice will become rose-colored owing to the solubility of the cobalt salt. If this solution be filtered and evaporated to dryness a bluish residue will be obtained, which, when heated with absolute alcohol, gives a solution that is pink when cold and

blue when warmed,—a well-known peculiarity of the solution of cobalt chloride. Moreover, from such solutions crystals of cobalt chloride may be obtained and identified under the microscope. As the lactate of cobalt is perfectly insoluble in absolute alcohol the experiment is a simple and striking demonstration of the existence of HCl in the natural juice. The author makes use of this method to demonstrate the existence of HCl in the gastric secretion of the frog, toad, and salamander. The freshly-prepared carbonate of cobalt is dissolved with difficulty by the natural gastric juice, although free HCl of the same strength acts upon it readily. Contejean thinks that this may be taken as an indication that the HCl in the juice is not free, but rather in some kind of feeble combination. As additional evidence toward the same conclusion, he states that when the natural juice is distilled in a vacuum at 40° C. (104° F.) until it reaches a syrupy consistency, no HCl comes over in the distillate; while with solutions of free HCl of the same strength the presence of HCl in the distillate may be detected with ease. Contejean demonstrates the existence of lactic acid in the natural juice, in addition to the HCl, by the formation of crystals of lactate of zinc. He believes that the lactic acid is a normal constituent of the juice, and not solely the result of fermentation, since he was able to obtain it from a dog whose stomach had been washed out, and in which a secretion of the juice had been started by allowing the animal to lick its food only.

He makes, also, the interesting assertion that in the secretion of the frog's stomach the HCl may be replaced by HNO_3 , provided the animal has been salted with nitrates. By "salting with nitrates" the author probably means the injection into the veins of a dilute solution of nitrate. In his experiments upon digestion with artificial gastric juice, he notes, among other things, that even prolonged digestion (one month) does not result in the entire conversion of the digested proteid to peptone; there always remains a certain quantity of propeptone (hemialbumose). He does not agree with the scheme of gastric digestion proposed by Kühne and Chittenden,—that is, the splitting of the proteid into anti- and hemi- constituents,—though he admits the existence of hemialbumoses, for which, however, he prefers the older name of propeptone. The steps in digestion, according to him, are syntonin, propeptone, and peptone. Against the existence of anti-

albumoses in natural digestion, he offers the following experiment: A quantity of egg-albumen was digested for two hours; the solution was neutralized, and the neutralization precipitate (syntonin and antialbumose, Kühne and Chittenden) was again submitted to digestion; and this process was repeated three times. At the end of the experiment, an antialbumose (?) was obtained which was almost unaffected by gastric juice; but if digested for two weeks, some of this was converted to peptone and propeptone (deuteroalbumose). His argument is that, since some of the antialbumose may be digested over into hemialbumose, there can be no fundamental difference between the two substances. It may be objected to this, however, that there was no guarantee that the substance submitted to the last digestion was pure antialbumose, in the sense used by Kühne and Chittenden.

Epiglottis in Deglutition.—Stuart and McCormick,^{277 Jan.} have had an opportunity to study the movements of the epiglottis in a man in whom, as the result of successive surgical operations for epithelioma, a large opening had been left in the side of the pharynx. Under ordinary conditions, the patient wore a pad over the opening, and was able to swallow, talk, or even sing, without any special difficulty. To observe the act of deglutition, a glass plate was fitted over the opening, and the man was given oysters to swallow. In this paper the authors treat only of the movements of the epiglottis in deglutition. They lay stress upon the fact that the epiglottis does not fold down over the larynx, in the way usually described in the text-books. What takes place in the act of swallowing is, in their own words, that “the bolus, after leaving the tongue, comes in contact with the inferior, posterior, or laryngeal surface of the epiglottis, and glides along this for a certain distance. . . . During the entire act the visible part, at least, of the epiglottis remains more or less erect, firmly applied to the tongue. Never at any time was any folding backward of it seen.” Future communications are promised upon the influence of the epiglottis in phonation, and upon the real mechanism of the closure of the larynx.

Reflex Inhibition of Movements and Tonus of the Stomach.—Wertheimer^{410 p.379} has discovered that stimulation of the central end of the sciatic or vagus may cause reflex inhibition of the tonicity of the stomach, or of the contractions of the muscles of the

stomach during digestion. This reflex effect was only partially abolished by section of both vagi, indicating that the efferent (inhibitory) fibres concerned in the reflex run partly in the vagi and partly in some other nerve, probably the splanchnic. The movements of the stomach, in these experiments, were recorded by small bulbs introduced into the stomach and suitably connected at the other end with tambours. The author points out the probable bearing of this discovery on the dilatation of the stomach which is known to occur in certain nervous diseases,—*e.g.*, hysteria, asthma, sciatica, etc.,—the dilatation in these cases being due, possibly, to a nervous inhibition of the muscles of the stomach, a reflex gastric dilatation comparable in its mechanism to a reflex vaso-dilatation.

Absorption of Water from Stomach and Intestines.—Edkins has investigated,¹⁷⁸
v.13,p.445 upon cats, the rapidity of the absorption of water from the stomach and intestines. The method used was to open the abdomen in the linea alba, select a suitable length of intestine, open it at two points, and wash out the contents with normal saline. Glass tubes were then inserted into the two ends and connected with a vessel filled with warm saline. The piece of intestine was kept warm by the application of hot flannels, and the experiment consisted in observing what quantity of the saline was absorbed in the course of an hour, when the piece of intestine was kept filled with the liquid under constant pressure, and with its circulation practically undisturbed. In experiments in which the stomach was used, the cavity was shut off by a ligature below the œsophagus. The animals were narcotized with morphia and atropia, the latter being used to prevent peristalsis. The results of these experiments, as given in the author's summary, were as follow: In the large intestine: "The average result of several experiments conducted at a constant optimum pressure gave 2.07 cubic centimetres of normal saline solution as the quantity absorbed per centimetre of length per hour." In the lower part of the small intestine: "The average result of observations in the region of the ileum gave 1.31 cubic centimetres of normal saline as the amount absorbed per centimetre of intestine per hour." In the upper part of the small intestine: "The absorption of normal saline solution was 0.727 cubic centimetre per centimetre of length per hour." With regard

to the stomach: "No difference was found, whether digestion had been going on in the stomach antecedent to the observation or not. In both cases the absorption was practically nothing." It will be seen, from this statement of results, that absorption is greatest in those portions of the alimentary canal in which absorption chiefly occurs under normal conditions. The results upon the stomach are contrary to what might have been expected, and are hard to reconcile with current opinions in physiology as to normal absorption from this organ.

Normal Waste from Intestinal Membranes.—Bernstein²⁴⁶
v.53,p.52 has made an effort to determine the relative importance of the cellular detritus from the alimentary canal in making up the fecal mass. The experiments supplement previous ones made by Hermann, and were arranged in two series. In the first series short lengths of the small intestine were isolated, were laid open along the border opposite to the attachment of the mesentery, and thoroughly washed out and disinfected with boracic-acid solution (3 per cent.). The piece of intestine was then sewed up lengthwise, the two ends were brought together and sutured, and the piece was dropped back into the abdominal cavity to stay for a certain time, varying from twelve to thirty-one days. In the second series a Thiry intestinal fistula was made with a portion of the intestine, so that the contents could be washed out at any time for examination. In both series a considerable mass of fecal-looking material accumulated in the intestine, which seemed to be composed chiefly of cast-off cells.

Intestinal-Hepatic Circulation of Bile.—Wertheimer⁴¹⁰
p.577 adds a new investigation to the one previously noticed (ANNUAL, 1892, vol. v, II-41) upon the fate of bile absorbed into or injected into the mesenteric veins. In his former paper he had found that sheep's bile injected into the dog's blood is rapidly eliminated by the liver. He was able to prove this beyond doubt by the fact that sheep's bile contains a substance, cholekæmatin, which gives a peculiar spectrum. In the present paper he attempts to show that bile injected into the mesenteric veins is eliminated before reaching the general circulation. His experiment to show this consisted in tying off all the arteries supplying the liver, in a dog, and then injecting sheep's bile into the mesenteric veins. The result, in successful cases, was an increased secretion of bile, in which the sheep-bile could be

detected by its spectroscopic reaction. The obvious explanation seems to be that the foreign bile was eliminated while passing through the portal circulation. Wertheimer uses the experiment to support the hypothesis of Schiff, with reference to the normal circulation of bile from intestine to liver. The hypothesis asserts that, under normal conditions, a portion of the bile emptied into the intestine is absorbed and passes to the liver in the portal circulation, there to be again secreted or eliminated, and that this circulation may be repeated a number of times for any given portion of the bile which does not happen to be passed out in the fæces.

Glycogen in the Liver.—Fränkel ²⁴⁶_{v.52,p.125} calls attention to a peculiarity of glycogen, as found in the liver, which, though mentioned before, has not been especially emphasized. The peculiarity in question is that extracts made of the liver, with cold water alone, or cold water containing chloroform or alkalies, in order to destroy the sugar-forming ferment, yield little or no glycogen. Whereas, extracts of liver made with hot water, with solutions containing the salts of the heavy metals, with metaphosphoric acid, trichloroacetic acid, etc., yield an abundant supply of glycogen. It would seem, from these facts, that glycogen is held in the liver in a difficultly-soluble form. Fränkel makes the hypothesis that, in the liver-cells, we have a proteid molecule which can take up sugar, change it to a higher carbohydrate molecule, and hold it in combination. When the liver is extracted with any reagent, such as those named above, which precipitates and coagulates proteids, this carbohydrate portion will be split off and will pass readily into solution as sugar or as glycogen. Glycogen, as such, upon this theory, does not exist in the liver, but is formed during the process of extraction. Fränkel describes a convenient method of obtaining glycogen which he has used for its quantitative determination. The method is as follows: The liver or other organ used is quickly minced and thrown into a 2- to 4-per-cent. solution of trichloroacetic acid in water; for each 100 grammes (3½ ounces) of tissue, 250 grammes (8¾ ounces) of the liquid are to be taken. The mixture is stirred for a short while, and is filtered, and the mass washed with the same liquid. The filtrate is precipitated by the addition of double its volume of alcohol. The precipitate is allowed to stand for twelve hours, is brought upon a filter, and is washed

with 60-per-cent. alcohol until the washings no longer give an acid reaction. It is then further washed with 95-per-cent. alcohol, absolute alcohol, and ether.

Formation of Fats from Proteids.—Pflüger²⁴⁶_{v.51,p.229} makes an important communication upon this topic. The object of the paper seems to be chiefly to prove that the calculations made by Voit and Pettenkofer, in their well-known researches upon the formation of fat from proteids, are based upon errors sufficiently important to invalidate their conclusions. Pflüger asserts that Voit made his estimations upon incorrect analyses of the fat-free meat with which his animals were fed.

According to the older analyses of Playfair and Bockmann, the N and C in dry flesh bear to each other the proportion of 1-3.451. A more recent analysis by Rubner gives the ratio as 1-3.277. Pflüger believes the ratio should be made still smaller, since dried flesh, free from fat, must still contain a certain proportion of glycogen, the average amount of which may be reckoned as 0.5 per cent. If a correction be made in accordance with this figure, this ratio will stand as 1-3.22. Now, Voit, in his analyses, used the ratio 1-3.684, and consequently reckoned upon too high a percentage of carbon in the meat used. For instance, in one analysis, a dog weighing 32.710 kilogrammes (72 pounds), to which 2500 grammes (5 pounds) of flesh had been given in twenty-four hours, eliminated in his urine 85.4 grammes ($5\frac{1}{2}$ drachms) of N. According to Voit's ratio this amount of metabolized proteid should have yielded 314.6 grammes (10 ounces) C, while according to the corrected ratio of Pflüger only 275 grammes ($8\frac{3}{4}$ ounces) of carbon could have been expected. In the feeding experiments of Voit and Pettenkofer they found that with an animal in nitrogen equilibrium, and fed with a large amount of lean meat, while all the N appeared in the urine, a considerable deficit of C was present in the CO₂ excreta, as compared with the C in the meat fed. They concluded that the excess of C had been stored in the body, and most probably in the form of fat. This constitutes the main proof, perhaps from the belief that fat is formed from proteid in the body, a belief which has come to be generally accepted in physiology on the strength of Voit's experiments. Pflüger goes carefully over all Voit's experiments and calculations, and applying the corrected ratio of N to C stated above, he finds that in the

large majority of the experiments (25 in number) there was no deficit of C in the CO_2 excreta, as compared with the C of the meat ingested. If his objections are well founded, it follows that Voit's experiments do not prove the retention of C in the body on a diet of proteid alone, and therefore the main evidence for the formation of fat from proteid falls to the ground. Of the 25 experiments criticised, only 5, according to Pflüger, did not show more C in the excreta than in the ingesta; that is, the diet (1500 grammes—3 pounds—flesh) was insufficient, and some of the fat of the body was oxidized in addition. In the 5 exceptional cases, even after the application of his correction, Pflüger is obliged to admit that the C deficit in the excreta was sufficient to account for a storage of 3.7, 3.8, 3.93, 13.6, and 1.6 grammes ($57\frac{1}{10}$, $58\frac{3}{5}$, $60\frac{3}{5}$, $199\frac{9}{10}$, $24\frac{7}{10}$ grains), respectively; whereas, in the estimates of Voit, the same experiments had been interpreted to show a storage of 34.4, 35.9, 56.7, 55.9, and 58.5 grammes ($8\frac{3}{4}$, 9, $14\frac{1}{8}$, 14, $14\frac{5}{8}$ drachms).

Pflüger next notices, briefly, certain other proofs which have been offered to show the possibility of a conversion of proteid into fat in the body. The fact that a nursing animal (dog) will give a richer supply of milk, the greater the proteid diet, he explains upon the supposition that the increase of cream comes from the fat of the body. The argument derived from the occurrence of fatty degeneration he disposes of by asking us to remember that carbohydrates, as well as proteids, form a constituent part of animal cells, and the fat produced may come from one as well as from the other. With reference to the production of fat in phosphorus poisoning, he shows that, from the undoubted increase in the N excreta, such animals must be living mainly upon proteids, and the apparent increase in fat, as shown by microscopical examination, may arise simply from the diminution in proteid in the cell; that is, it may be a relative increase only. The best analyses in cases of phosphorus poisoning show, in fact, that the absolute increase in fat is very slight, small enough to come within the limits of error of such determinations or to be accounted for as being derived from the small carbohydrate supply stored in the body. The production of fat in adipocere and in the ripening of cheese he explains by attributing it to the action of bacteria or molds; and the increase in fat contents of maggots fed upon

serum of a known composition in fat, which has seemed one of the clearest proofs of the possibility of the conversion of proteid to fat by an animal organism, he explains by asserting that bacterial action upon the proteids of serum may have furnished an amount of fat in excess of that present in the serum at first, and that the excess of fat found in the bodies of the maggots could be accounted for in this way.

In a second long paper,²⁴⁶
V.52,p.1 upon the formation of fat and proteid in the body, Pflüger renews his attacks upon the doctrines of Voit. The most important fact developed is that a dog may be kept in good working condition upon an almost perfectly pure proteid diet for many months—in his experiment from May 1st to December 20th. He thinks that in this case the conditions of life were reduced to their simplest form, and would therefore measure the actual nutritive needs of the body by the smallest amount of lean meat capable of keeping it in nitrogen equilibrium. In a condition of rest and at a medium temperature, the nutritive need of a dog is expressed by the equation: 1 kilogramme ($2\frac{1}{5}$ pounds) of weight = 2.073 grammes ($31\frac{1}{9}$ grains) N in the meat fed. From his stand-point, it should be added, the nutritive need of an animal depends upon its weight in flesh only, since the fat loses nothing. In feeding an animal, if the proteid food alone is not sufficient to cover the nutritive need of the body, one can increase the non-nitrogenous diet at will without augmenting the body metabolism, since the excess of nitrogen-free material is, under these conditions, stored as fat. For the purpose of fattening, therefore, the most advantageous diet will be one containing the least possible (with reference to the nutritive need) proteid and the greatest possible amount of starch. In fact, the non-nitrogenous food-stuffs are used only to the extent that the proteids are insufficient for the body need; if more is eaten it will be stored as fat.

The very marked difference between the views of Voit and Pflüger comes out distinctly in just this point of the value of non-nitrogenous foods as a fattening diet. According to Voit the non-nitrogenous food-stuffs are fat-producers chiefly in that they are used as fuel in the body in place of the proteids, and thus permit of a larger percentage of the latter being converted into fat; whereas, according to Pflüger, the nitrogenous foods are

fat-producers in that they are burnt in place of the non-nitrogenous material, and permit of a larger percentage of the latter being converted directly into fat. As for the formation of flesh in the body, it can come only from the excess of proteid in the diet; and since for each ten parts of proteid fed only one part can be saved as flesh, the laying on of flesh is an expensive and difficult process as compared with the laying on of fat.

Decomposition Products of Proteids.—Drechsel ^{p. 236, '91} publishes a number of researches by himself and his pupils, the general aim of which has been to throw light upon the decomposition products of proteids. A more complete knowledge of their products, he believes, is a necessary preliminary to any proper conception of the structure of the proteid molecule, and the varieties in molecular structure which give rise to the numerous kinds of animal and vegetable proteids. In experiments first made upon casein, Drechsel was able to show that by the hydrolytic action of hydrochloric acid there is formed, among other products, a base, lysin ($C_6H_{14}N_2O_2$), together with a related kreatin-like body, lysatin ($C_6H_{13}N_3O_2$) or lysatinin ($C_6H_{11}N_3O$), the two differing, as in the case of kreatin and kreatinin by a molecule of water.

Similar experiments made by his pupils demonstrated the existence of the same bodies in the decomposition products of gelatin and of vegetable proteid (conglutin). Moreover, the same substances were found after the prolonged action of trypsin upon fibrin. These bases must therefore be reckoned among the normal products of the hydrolytic splitting of the proteid molecule. The discovery of these bases open up a wide field of research. Drechsel points out the possibility of a relation between them and the ptomaines. In the present papers, however, he discusses only the relationship between them and the formation of urea. He was able to obtain urea from the lysatinin by the action of baryta-water, thereby demonstrating for the first time the possibility of obtaining urea directly from proteids by laboratory methods. It is important to notice that, in this method of formation, the urea is produced not by oxidation, but as the result of a series of hydrolytic decompositions. Drechsel believes that some of the urea of the body is formed in this way; and from a calculation based upon Selutzenberg's results, he believes that one-ninth of the total urea may, on theoretical grounds, be accounted for upon this hypothesis.

In a paper in this same series, written in connection with Abel, Drechsel makes a significant contribution to the theory of the formation of urea by oxidation. In an examination of the urine of horses, they were able to demonstrate the existence of carbamate of calcium, and, previously, Drechsel had shown the existence of carbamic acid in the blood of dogs, and its formation by oxidation from nitrogenous organic substances. Resting upon these facts, he advances the theory that urea may be formed in the body from ammonium carbamate. The series of events leading to the formation of urea from the amido acids is pictured as follows: Leucin, etc., by successive oxidations are converted to NH_3 , CO_2 , and H_2O . The CO_2 unites with the ammonia in alkaline liquids to form ammonia carbamate, and this by alternate reduction and oxidation is changed to urea. The possibility of this last reaction has been demonstrated by Drechsel by electrolyzing solutions of ammonium carbamate with the production of urea. The changes which take place are explained by the following equations: $\text{NH}_2 \text{ COO NH}_4 + \text{O} = \text{NH}_2 \text{ COO NH}_2 + \text{H}_2\text{O}$; and $\text{NH}^2 \text{ COO NH}_2 + \text{H}_2 = \text{NH}_2 \text{ CO NH}_2 + \text{H}_2\text{O}$.

Curare Diabetes.—The well-known fact that curare causes diabetes has been explained by some as the result of the dyspnœic condition. As evidence for this explanation, it has been stated that winter frogs when curarized do not show diabetes, while summer frogs do; the winter frogs, owing to their lessened oxidations, being able to get sufficient oxygen through the skin. Langendorff³²⁰_{p. 476, '91} brings this statement into discredit by showing that summer frogs with the lungs removed do not thereby become diabetic, and, on the contrary, winter frogs under curare may show diabetes.

MISCELLANEOUS.

Taste-Sensation.—Shore¹⁷⁸_{v. 13, p. 191} has studied the action of a decoction of the leaves of *Gymnema sylvestre* on the sense of taste. The most noteworthy effect of this decoction is the paralysis it causes of the sweet and bitter tastes, the action on the sweet tastes being the more marked of the two. The acid and salty tastes do not seem to be affected by it at all. This differential action enabled Shore to analyze some of the more complex taste-sensations, especially that caused by the electrical current. The anode in the back of the tongue gives a compound sensation containing a bitter

component. This latter was eliminated by the action of gymnema, and the residual sensation was a weak, acid, salty taste. Shore states, also, that the local application of cocaine will abolish sensibility to pain and general feeling before that to taste. The application of this method of analysis to the acid and salty tastes leads him to believe that substances giving these tastes probably stimulate two sets of fibres,—those of general feeling or pain, and those of true taste-sensations,—though with reference to the second set he believes that they are different from the typical taste-fibres, sweet and bitter, and are probably to be considered as a “specialized form of tactile sensation.” As between bitter and sweet, he is inclined to believe that each is mediated by its own set of fibres.

Cobra-Poison.—Kanthack¹⁷⁸_{v.13,p.272} has made a careful investigation of some points in the chemistry of the cobra-poison, and the possibility of obtaining immunity from its effects. The poison is a “clear, transparent fluid, varying in color from a yellow or straw tint to complete colorlessness.” When perfectly fresh from the gland it has an alkaline or neutral reaction, and its poisonous properties seem to be due to an albumose. The author was not able to detect a poisonous globulin in addition, such as was described by Mitchell and Reichert; on the contrary, he believes that he disproves completely the existence of a globulin. The poisonous albumose was prepared by several methods, and from the reactions obtained it seems certain that only one such is present, belonging to the primary group. Examinations for an alkaloid gave negative results. Pure solutions of the albumose killed rabbits and fowls very quickly. Three minims injected into the peritoneal cavity of rabbits killed them in from fifteen to thirty minutes. When injected subcutaneously it acted more slowly, killing in from sixty to seventy minutes. The poison has a marked cumulative action. Small doses, repeated at intervals, killing more rapidly than single large doses. Heating the poison or the solution of the pure albumose either weakened or destroyed entirely its poisonous properties, although concentrated solutions required boiling for one to two hours before this last result could be obtained.

Diffused light had not a weakening effect upon the poison. Chlorine-water, if allowed to act sufficiently long, destroyed the poison, while carbolic-acid solution (10 per cent.) only delayed its action, unless the poison solution was weak, in which case it might

destroy it altogether. A very important fact is that heat, chlorine, and carbolic acid, though they may destroy the poisonous action of the albumose, do not destroy its chemical identity, since its solutions still give a good biuret reaction. Caustic-potash solutions have the power of preventing the action of the poison, although the subsequent addition of acid will restore this property. The effect of the reagents mentioned, and others, is presented in a convenient table, for which reference must be made to the original. The author finds that, by successive injections of sublethal doses, animals may be "accustomed to resist large doses," but it is impossible, by this method, to confer complete immunity. The blood or serum of the cobra itself failed to confer immunity when injected. Strychnine had no beneficial action whatever. Substances which outside of a body were capable of destroying the poison when directly mixed with it proved ineffective as preventives when injected into the body.

Crystallized Egg-Albumen.—The discovery, by Hofmeister, of a means of crystallizing egg-albumen from its solutions, has been referred to before in the ANNUAL. By the former method of preparation it was uncertain whether the crystals obtained were pure proteid, or a compound of the proteid with ammonium sulphate.

In a new paper ⁸³ he describes a modification of his method, which gives him the crystalline proteid apparently quite perfectly pure. The modification consists in keeping the crystals as formerly prepared under alcohol. The proteid becomes coagulated in a few days, but does not lose its crystalline form. It can be washed with water, alcohol, and ether, and thus be obtained free from adherent substances. The crystals treated in this way, when dried at 110° C. (230° F.), appear as a reddish-white powder, not hygroscopic, and perfectly free from ash. Analyses gave the following average result: C, 53.28; H, 7.26; N, 15.00; S, 1.09. The striking features of the analyses are the low values of the sulphur and nitrogen.

Function of the Supra-renal Capsule.—Abelous and Langlois ⁴¹⁰ have made a series of experiments upon frogs, in which one or both of the supra-renal capsules were destroyed by heat. The destruction of both capsules invariably resulted in death. In winter frogs the fatal effect came only after twelve or thirteen

days, while in summer frogs it required but forty-eight hours. The chief observable phenomenon was a progressive paralysis, which began in the lower limbs and spread anteriorly. Complete destruction of one capsule was not fatal; in fact, did not seem to affect the animal. If one capsule were destroyed and the other injured only in part, the evil effect depended on the extent of lesion to the second capsule; if a considerable portion of this were left undisturbed, the animal recovered. After removal of both capsules the fatal effect could be delayed by the insertion of small pieces of the removed gland into the dorsal lymph-sac. In subsequent experiments they discovered that the effects of removal of the capsules were very like those following the injection of curare; the paralysis in the former, as in the latter, seemed to be due to paralysis of the motor end-plates. They infer, therefore, that death is caused by the appearance of one or more poisonous substances in the blood, which paralyze the end-plates and, possibly, affect the muscles in addition. Reasoning back from this, they conclude that the normal function of the adrenals is to elaborate an internal secretion, which shall neutralize or destroy those poisonous substances which have their origin, possibly, in the chemical changes of muscle contractions.

Similar experiments carried out on guinea-pigs gave quite identical results. They found, moreover, in these animals, that injections of extracts of the glands into the animals, after complete excision, mitigated the effects, but did not prevent a fatal termination.

Thyroidectomy.—Gley⁴¹⁰_{p.81} makes several experimental contributions to the thyroid question. In the first paper the results of removal of both thyroids in dogs are given under the following heads: Bulbar troubles, apparent in the beginning and manifesting themselves in vomiting and dysphagia; anorexia and intestinal troubles; trophic troubles, shown by a small number of animals; paralysis, especially of the extensors; convulsions, clonic and tonic; increased temperature and polypncea; the presence of albumen and biliary acids in the urine, a variable result.

Gley gives a very interesting table, summarizing the thyroidectomies performed so far, and the number of animals which have survived the operation. The table, somewhat shortened, is as follows:—

AUTHORS.	Animals.	Death.	Recovered.
Schiff	60 dogs.	Fourth to thirtieth day.	1
Colzi	Dogs.	Third to eighth day.	0
Sanquirico and Canalis	11 dogs.	Fourth to twenty-seventh day.	0
Wagner	Dogs and cats.	Second to eleventh day.	0
Albertoni and Tizzoni	24 dogs.	Twentieth to fifty-third day.	4
Fuhr	14 dogs.	Second to twenty-first day.	1
Rogowitch	40 dogs.	Second to twenty-eighth day.	4
Herzen	3 cats.	Sixteenth to thirty-seventh day.	0
	Dogs.	Fifth to thirty-seventh day.	0
Horsley	Apes.	Fifth to thirty-seventh day.	0
Fano et Zanda	23 dogs.	Second to thirtieth day.	1
Lupo	11 dogs.	Tenth to thirty-first day.	0
D'Ughetti	100 dogs.	Tenth to thirty-first day.	2
Von Eiselsberg	Cats.	Tenth to thirty-first day.	0
Gley	17 dogs.	Second to eleventh day.	1

In a second paper⁴¹⁰_{p.135} he calls especial attention to the fact that previous observers have stated that both thyroids may be removed from rabbits without fatal results. This difference between rabbits and dogs or cats has led to certain generalizations as to the effect of a herbivorous diet upon the functions of the thyroid. Gley has discovered that the results upon the rabbit are not essentially different from those upon the carnivorous animals. If the thyroids alone are removed no evil effect follows, but if the small bodies lying posterior to the thyroids, which have been described in anatomy under the name of parathyroids, are also removed, the rabbits die, with muscular symptoms resembling those described so often for the carnivorous animals. Death comes very rapidly, the fatal symptoms developing within twenty-four hours.

In a third paper⁴¹⁰_{p.311} Gley investigated the possibility of other organs assuming, vicariously, the functions of the thyroid. With reference to the spleen he found that, in rabbits and dogs, previous extirpation of this organ did not influence either the rapidity or gravity of the symptoms following thyroidectomy. He attempted similar experiments upon the hypophysis. The organ was reached from above by a trocar pushed down to the sella turcica, the needle being run through into the gland, which was then lacerated. The rabbit survived. On November 10th the spleen was removed from this animal, on December 3d both thyroids were removed, and on February 11th the operation on the hypophysis was made. After the last operation troubles of nutrition and muscular symptoms were noticed, and Gley believes that the

experiments indicate a real relationship in functions between the thyroids and the hypophysis. Finally the efficacy of injections of extracts of thyroid was tested. The extracts were made with aseptic precautions, and were injected at varying times after the operation of thyroidectomy had been performed. The results were uneven. In some cases the animals survived or showed a diminution in the gravity of the symptom, while in other cases there was apparently no beneficial result. Gley attempted to determine also the relative toxicity of the urine before and after thyroidectomy. He indicates the toxicity by what he calls the urotoxic co-efficient; that is, the quantity of toxic matter that a unit of weight of animal produces in a unit of time. Before thyroidectomy—that is, in the normal animal—he found that 1 kilogramme ($2\frac{1}{5}$ pounds) of dog secreted sufficient poison in the urine in twenty-four hours to kill 268 grammes ($8\frac{5}{8}$ ounces) of rabbit, while after thyroidectomy the toxicity had increased so that the secretion of 1 kilogramme ($2\frac{1}{5}$ pounds) of dog was fatal to 387 grammes ($12\frac{1}{2}$ ounces) of rabbit.

These experiments seem to give some actual basis for the hypothesis that the normal function of the thyroids is to remove some poison from the body. After removal of the thyroids this poison accumulates in the blood and appears in part in the urine.

GENERAL INDEX.

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 CARDIAC.
 FOR PAROXYSMS OF DYSPNOEA, *morphine* and *ether* subcutaneously; or internally, *morph.*, gr. 1-20 to 1-12 (0.005 to 0.005 grm.), and *ether*: use fagellations with cloths wet with cold water on the skin: if pulse continues small, use inject. of *ether*, also give *alcohol*, *tea*, or *coffee*: inhalations of *oxygen*, i. B-32. During attack place hands in hot water. Inhalations of *ammonia*. Every 5 or 10 min. give gtt. iij of *lindannum* in *cherry-lavender water*, and inject *morphia* and *atropia sulph.* hypoderm., i. A-32. Ice over spinal column, i. A-32. At beginning of the attack place a piece of cotton wet with *cochine sol.* (1 to 20) as far back in the nasal fossa as possible, or drop the sol. into the nose. If this fails to relieve, let the patient inhale from a handkerchief gtt. vi to xij of *pyridin*: as a last resort, *morphia* hypoderm., i. A-32.
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 BLADDER, DISEASES OF.
 CYSTITIS, ACUTE. Rest in bed: leeches to the perineum; poultice to perineum and over abdomen; brisk saline cathartics; copious draughts of pure water containing *citrate* or *acetate of potash*, gr. xv to xx (0.97 to 1.30 grms.); *spirit of nitrous ether*, 5ij (7.78 grms.) ev. 2 hrs.; supposit. of *ext. opium*, gr. ss to j (0.032 to 0.065 grm.); ice-water injections into rectum, i. F-61. Tepid hip-bath; narcotics, *opium* or *belladonna*, by mouth; milk diet; injections of weak sol. of *nitrate of silver*, i. F-71. *Cocaine*, v. A-38. *Sulolated retinol*, v. A-121. First wash bladder with *boric-acid sol.*, then inject 5¼ to 7¼ (5 to 30 grms.) of *retinol*, v. A-121. *Sulol*, v. A-121.
 BLENNORRHOIC. *Sulolated retinol*, v. A-121.
 CHRONIC. Injections of *cochine gtt. xv* into the bladder, i. F-60. *Benzoic acid*, gr. v (0.32 grm.) six times daily, i. F-62. *Sandal-wood oil* in *III x* (0.62 grm.) capsules; *boric acid*, gr. v to x (0.32 to 0.65 grm.); injections of tepid water into bladder, 5iv (120 grms.) once or twice daily, i. F-62. Injections of *sul. sultryl*, 5i to 1 pint (3.89 grms. to 2, litre) of water, or *boric acid* 5j to pint or *alum* in weak sol., i. F-63. *Bichloride of mercury* injections (1 to 26,000), gradually increasing, or *hydrogen peroxide*, 1 part to 5 of water; injections of 2 % sol. of *cochine*, 5ij (60 grms.), i. F-63. Perineal section and drainage, i. F-61. Watermelon as a diuretic; *benzoate of ammonia*, gr. x (0.65 grm.) 4 times

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grm.) daily, i. F-65. Injections of
of *silicic acid*, gr. xx (1.30 grms.) to
gr. xxx (1.94 grms.) to 5j (30 grms.), i.
F-66, 67. Washing out of bladder by
medicated injections: *boracic acid*, 2
% sol.; *borax or table-salt*, 3 % or 4 %
sol.; *chlorate of potash*, 2 % sol.;
sulphate of zinc, *acetate of lead*, infus.
hydrost. Canadensis, i. F-68. Injections
of *salicylic acid*, weak sol., i. F-68, 69.
Mercuric chloride, 1-5000 to 1-1000.
i. F-70, 71. Tinct. of *bellad. root*,
gtt. v to xxvii, 3 times daily, i. F-72.
½ *Oxalic acid*, gr. xv (1 grm.); *syrr*,
orange-peel, 3j (30 grms.); distilled
water, 3iv (120 grms.). M. Sig.: A
tablespoonful ev. 2 days, i. F-72. *Salol*,
full doses, gr. xv (0.97 grm.) t. d.;
sandal-wood oil or infusion, i. F-10.
Tinct. of *belladonna* in large doses, i.
F-10.

LOCAL TREATMENT. Sol. *salicylic*
acid; sol. *nitrate of silver*; sol. *bi-*
chlor. of mercury, 1 to 5000.
DIET. Largely pure water with
lime-water; no alcohol or stimulants,
i. F-11.

FOR PAIN, *Dover's powder*. To pre-
vent painful efforts at micturition,
tinct. of *opis*, i. F-59. Granules of
hyoscyamine, i. F-59. *Morphine* or
of *camphor*; injections of *morphine*,
i. F-60. *Salol*, v. A-124.
TUBERCULAR. *Salubated retinol*, v.
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EXCRETA.
IN CHILDREN. Foradid current by
shock and tetanization to neck and
memb. portion of urethra, v. C-10.
Tinct. *belladonna*, 5ss to j (1.875 to
3.75 grms.) in 24 hours, v. A-24, 25.

IRRITABLE BLADDER. *Phenacetin* and
salol, gr. x to xv (0.65 to 0.97 grm.) at
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TO PREVENT EPISTAXIS, absolute milk diet, *bromide of potassium*, weekly purgation, i. F-50.
FOR ANÆMIA, some preparation of iron, i. F-54.
FOR HEART-FAILURE, *tinct. of nux com.*, $\frac{1}{2}$ x (0.65 grm.) l. d.; *digitalis*, gr. $\frac{1}{2}$ (0.065 grm.); *nitrate of caffeine*, i. F-41.

BRONCHITIS.

Powder of *corchoris*, gr. v to xx (0.32 to 1.3 grms.), 3 or 4 times a day, v. A-49. Inhalations *fld. ext. hydrastis Canadensis*, 1 part to 3 parts of salt water, v. A-73. *Camphorated oil* as an expectorant, v. A-36. *Ert. eucalypti fld.*, i. A-28. Full, deep inhalations of pure air, and judicious exercise of the deep muscles of the chest, i. A-28. Inhalations of *oxygen*, i. A-27.

ACUTE. Inhalations *oxygen*, v. A-107. If general condition is good, give a tablespoonful every hour of the following: *tinct. of acanite*, $\frac{1}{2}$ vj (0.36 grm.); *chloroform-water*, 5j (8 grms.); water, q. s. ad 5ij (90 grms.). Add to second bottle *tinct. of bryonia* $\frac{1}{2}$ xxiv (1.5 grms.), and give a tablespoonful ev. two hrs., v. A-34, 35.

CATARHAL. *Antipyrin*, v. A-14. Climate of Deix, in the Swiss Engadine, v. E-12, 13. Conrad Clar's cross-handage method, v. E-21. Powder of *corchoris* with *cinnamon* or *ipeacuanha*, v. A-49.

CATARHAL IN CHILDREN. *Bicarbonate of potassium*, gr. 1-20 (0.0032 grm.) ev. 15 to 30 min., to child 1 yr. old, v. A-30.

CHRONIC. *Rocella tinctoria*, v. A-92. Climate of Nice, v. E-13. Inhalations of oxygen, v. A-107. Compressed air passed through a solution of *carbolic acid* or *eucalyptus* or *evroline*, and followed by inhalations of *ammon. chloride*, v. A-3.

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SUBACUTE. *Firicin* (phosphorus, iodine, bromine) in $\frac{1}{2}$ xx to 5j t. i. d., v. A-68. FOR FEVER, *acetanilid*, v. A-1. Compressed air, v. A-3.

TUBERCULAR. Inhalations of *fld. ext. hydrastis Canadensis*, 1 part to 3 parts of salt water, v. A-73.

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Cleanse with warm sol. of *sublimat* (1 to 2000), then cover with perforated oil-silk which has been steeped in the sol.; over this place *baotadint* (but cover with gauze percha tissue; then envelop all in *sublimat* "ganze" tissue; secure with bandage, iv. A-9. Cleanse with 3% *carbolic* or *salicylic acid sol.*, then apply *pwd. bismuth nit.*; cover with impermeable dressing, iv. A-9. *Dermatol* in ointment, v. A-53. Ten to 20 or 30% *thiophen gauze*, v. A-135. *Euphorin*, iv. A-66. *Euphorin oint.* 3 to 5%, or 2% oil, v. A-63. *Euphorin* in *pwd.* or *gauze* (10%) or oint., with *rosella* and *lanolin*, 3 to 10%, v. A-61, 62. Milk appl. by means of compresses, to be renewed night and morning, iii. O-11, 12. Skin-grafting, Thiersch's method, iii. H-27. Italian method, iii. H-27. *Sociodiol* in ointment or *pwd.* *Oint. of sociodiol*, gr. xl (2.66 grms.) to 5j (1 grms.), with 5ss (15 grms.) each of *lig. paraffin* and *lanolin*. *Pwd. sociodiol*, 5ss to 5i (2 to 1 grms.), with 5j (30 grms.) of *lycopodium*, iv. A-68.

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FOR THE ACID STATE, enterocolysis, transfusion of blood, or intra-venous injection of saline solution; or inject into subcutaneous connective tissue artificial serum at a temp. of 104° F. (40° C.), containing 3j (1 grms.) of *chloride of sodium* and gr. xlv (3 grms.) of *carbonate of sodium* per qt. (litre) of sterilized water, i. D-20.
FOR STAGE OF TYPHOID REACTION, guard against acidity of the blood by a 10 % to 15 % sol. of *salt water* for enterocolysis, instead of *tannic acid*, and, if necessary, continue hypoderm. inject. of 1. D-20. *Cocaine*, gr. 4-5 to 3i $\frac{1}{2}$ (0.05 to 0.10 gm.) hypoderm., and stimulate with champagne and cognac, i. D-20. Neumann's method, i. D-21. R. *Chloroform*, gr. xv (1 gm.); *alcohol*, 5ij (8 grms.); *ammon. acetate*, 5iij $\frac{1}{2}$ (10 grms.); water, 3iij $\frac{1}{2}$ (110 grms.); *syr. of hydrochlor.* of *morphine*, 5iij $\frac{1}{2}$ (10 grms.). M. Dose, tablespoonful ev. half-hour until symptoms subside, i. D-21.
FOR EMBESIS, warm bath (not under 99.5° F.—30° R.), with bag of ice to the head; give, a few minutes after bath, *catemol*, gr. iij $\frac{1}{2}$ (0.08 gm.), and *castor-oil*, gr. xxx (2 grms.), with wine and brandy; after coming out of the bath, rub dry and place a large sinapism on sides and abdomen up to middle of sternum, i. D-17. Lesage's method, i. D-18.
FOR CULUS, friction of skin with linen immersed in cold water; then a sitz-bath, temp. 114° to 50° F. (80 to 15° C.), for 15 or 30 minutes, wrapping parts of the body not in water with woolen cloths and rubbing the abdomen vigorously, i. D-19. Intra-venous transfusion of 2 qts. (2 litres) for adults, and less in proportion for children, of *distilled water*, sterilized, Oij (1000 grms.); *salt. chloride*, 5iij $\frac{1}{2}$ (3 grms.); *salt. sulphate*, 5iij $\frac{1}{2}$ (10 grms.). M. Sig.: Heat to 136° F. (58° C.), and let each transfusion last a quarter of an hour, i. D-19.

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	v. j (0.065 to 0.389 grm.). Neutralize	ii. L-15; Jacobi, Rachford, ii. L-16;
	acids in stomach. <i>Bismuth salicylate</i>	Louis Fischer, Chapin, Baginsky, Ja-
	gr. iij to x (0.191 to 0.648 grm.) ev. 2	cobi, ii. L-18; Fischer, ii. L-19; Paul
	or 3 hrs. <i>Sol. salicylate</i> , ii. L-18.	
	<i>Glycerin. Resorcin</i> , gr. iv to x (0.259 to	
	0.618 grm.) a day, ii. L-19. <i>Opium</i> ,	
	<i>Boer's powder</i> , gr. i-10 to $\frac{1}{3}$ (0.0006	
	to 0.022 grm.) ev. 2 to 3 hrs., with or	
	without <i>bismuth salicylate</i> , ii. L-18, 19.	
	TO CHECK HÆMORRHAGE, <i>nitrate</i>	
	of <i>silver</i> , gr. 1-50 to 1-30 (0.0013 to	
	0.0022 grm.), ii. L-19. For erosion	
	near anus with tenesmus, paint part	
	with solution of <i>cinchon</i> or <i>Magnolia's</i>	
	<i>solution</i> , ii. L-19. As a stimulant,	
	<i>musk</i> gr. i to ij (0.06 to 0.13 grm.) ev.	
	15 to 30 min. until gr. vj or xij (0.49 or	
	0.80 grm.) have been taken. <i>Camphor</i> ,	
	gr. $\frac{1}{3}$ to ij (0.015 to 0.13 grm.),	
	rubbed up with <i>glycerin</i> , or <i>xpts. cam-</i>	
	<i>phor</i> , gtt. x to xv every hr., ii. L-19.	
	<i>Whisky</i> , especially during first 24 hrs.	
	of treatment; meat-broths, cream,	
	barley-water, and oatmeal-water with	
	milk; sterilized milk in small quanti-	
	ties and diluted, ii. L-16, 17. Bathing	
	once or twice a day with sea-salt	
	water, made by adding a handful of	
	salt to about 1 gal. of water at about	
	80° F. (25.6° C.), and, at end of	
	bath, pouring water of about 60° F.	
	(15.5° C.) over the whole body, ii.	
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TREATMENT (continued).

restlessness and pulsation of the fontanelle, place a small rubber bag half-filled with cracked ice over top of head and keep there for several hours, ii. L-21. For great prostration with pallor, cold extremities, and sometimes cyanosis, give a hot mustard bath, made by wrapping a handful of ground black mustard in linen and suspending in water of about 100° F. (37.7° C.); immerse the child's body and gradually raise temp. of bath by adding boiling water until reaction sets in, then wrap child in warm blankets, ii. L-21. *Naphthol*, gr. j (0.065 grm.) ev. 3 hrs., v. A-100, 101. *Cerica papaya*, gr. i to ij (0.065 to 0.13 grm.), v. A-40. Bathing, v. E-30. *Est. kola-nut*, gr. xvss (1 grm.); *spr. quina*, 3ij (60 grms.). One dessertspoonful in divided doses in course of 24 hrs., v. A-89. Peptonized milk, ii. L-18. Irrigate the bowel with *boracic acid* or salt (*sod. chloride*) in lukewarm water, 1 qt. (1 litre), using a fountain-syringe and a soft catheter (No. 10) or a Tiemann's rectal tube, and irrigate until the discharges are clear, ii. L-18. Salt-water air, ii. L-20.

To CHECK PERSPIRATION, sponge with alcohol and water, equal parts, or bay-rum, or vinegar and water, ii. L-20. *Ether sulphuric*, gtt. x hypoderm. Brandy, gtt. x to xx, injected into abdomen, ii. L-21.

IN EXTREME STUPOR, *spts. ammoniac aromat.* gtt. ij, with water gtt. x, hypoderm., ii. L-21.

IN OBSTINATE CASES, hypoderm. inject. *spts. camphoræ*, ii. L-19.

IN COLLAPSE, alcohol injected with hot water into bowels through flexible catheter (No. 12). By mouth, whisky and water, or whisky with gruel, ii. L-19. *Calomel, tannate of quinine*, irrigation, starch-water enemata, ii. L-19. Warm *chamomile (flor. matricaridis)* irrigations 2 to 3 times daily, ii. L-20.

FOR CASES WITH ABNORMAL ACID FERMENTATION, white of egg may be used, ii. L-17.

CHRONIC. *Arsenite of copper* by mouth and by bowel, ii. L-22. Milk diet, with interval between feeding of from 4 to 6 hrs., ii. L-22.

SCRUPULE. Cold bath and wet compress, v. E-30. Intestinal irrigation, v. E-30.

DIPHTHERIA.

PROPHYLAXIS. Vapor of *infusion of valerian, thymol*, or simple *alcohol*; change room during day; inhalation of *oxygèn* ev. 2 hrs.; ventilation indirectly through doorway, i. I-13.

GENERAL TREATMENT. Appl. ev. 2 or 3 hrs., by means of camel's hair pencil or swab, the following: *R. Acid carbolicæ, acidi citrici, tinct. iodi*, 53 gr. xlv to lxxx (3 to 5 grms.); *spts. rini gallici*, 3iij½ (100 grms.). M. Also a gargle of *sod. chlor.* or *pot. chlor.*, i. I-11. Lemon-juice, i. I-11. *R. Phenic acid*, 5v (20 grms.); *sodium sulphuricinate*, 3iiss (80 grms.). M. Apply by tampon immersed in a 20 % sol., using 5 or 6 times daily, i. I-11. *R. Chloride of zinc*, 5iv (15 grms.); *yellow cinchona-bark* in powder, 5iv (15 grms.); honey, sufficient to make a thick paste. M. Apply ev. 2 to 4 hrs. by means of pledget of cotton, i. I-11, 12. *Succinate of iron*, v. A-85. *Muriate of pilocarpine*, gr. ¼ to gr. 3-5 (0.008 to 0.04 grm.); *pepsin*, gr. x to xij (0.65 to 0.78 grm.); *dil. muriatic acid*, 1l½ to ij (0.13 to 0.20 grm.); water, to make 3ij (60 grms.). M. Sig.: 1 to 1 teaspoonfuls in wine ev. 1 to 4 hrs., v. A-86. To destroy

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GENU VALGUM (continued).
it should not go more than 1 cm. below
the head of the bone, iii. G-6.
FOR BOW-LEGS, KNOCK-KNEES, AND
INTOXICATING AFTER CLUB-FOOT, osteo-
clasis, by Grattan's method, iii. G-7, 8.
GLANDERS.
Lannelongue's chloride-of-zinc treat-
ment, iii. L-19, 20.
GOITRE.
INTERNAL TREATMENT. *Ammon. chlo-
ride*, gr. viii to x (0.55 to 0.65 grm.),
t. i. d., long continued; also, extern.,
oint. of biniod. of mercury of strength
sufficient to slightly irritate the skin,
iv. H-3.
IF SOLID, inject *tinct. iodine*, iv. H-3.
FOR NARCOSIS, first *chloroform*, to be
continued with *ether*; also inject of
cocaine and *morphine*, iv. H-3.
SURGICAL TREATMENT. Complete enu-
cleation (Bose's method), iv. H-3.
WHEN OPERATION IS CONTRA-INDI-
CATED, use hypodermat. inject. of
iodoform (Moseitz-Moorhof's meth.);
also, intern., *iodoform*, gr. iij (0.20
grm.) a day, continued for 20 to 30
days, iv. H-3.
CYSTIC. Cut away part, wash out con-
tents, and apply a saturated solution
of *chromic acid*, v. A-43.
EXOPHTHALMIC (GRAN'S DISEASE).
Exalgin, gr. ss (0.032 grm.), dissolved
in H_2O (0.31 grm.) of *spt. of wine* and
tablespoonful of water, ev. $\frac{1}{2}$ hr. for 3
doses, to relieve pain, v. A-64, 65, 66.
Increase respiration by means of Tay-
lor's "respirator," iv. H-6. *Antipyrin*,
v. A-14, 15. Inject, of 2 or 3 drops
of 10 % sol. of *iodoform* into base of
goitre, withdrawing slightly, and in-
ject, v. A-82.
IF ANÆMIA, milk treatment, *iron*,
hydrotherapy, electricity (faradic or
galvanic), iv. H-6.
FOR RAPID HEART, *digitalis*, *stro-
phanthus*, *spt. brom.*, iv. H-6.
SURGICAL TREATMENT. Complete re-
moval of gland. Ligation of thyroid
vessels, iv. H-6.
GOUT.
Adherence to such habits of life, in-
cluding exercise, diet, and clothing, as
will keep amount of uric acid formed
in the system small, i. K-8. Diet
of fresh vegetables and fruits, with
meat sparingly, with exclusion of
sugars and starches. Active physical
exercise, alkaline baths with friction.
Lithium salts, well diluted, i. K-8.
Antipyrin, v. A-14. Electric current,
sinusoidal method, applied by means
of bath, v. C-1. Climate of Nice very
beneficial, v. E-13. Bedford Magnesia
Spring water, v. E-17. IS. Hot-air
baths in boxes, followed by cold
douches, v. E-36. *Piperazin*, gr. viii
to xv (0.52 to 0.97 grm.) daily, in pwd.
form or in "gout-water" (*piperazin*
and *phenacoll*, 33 gr. xv (0.97 grm.)
dissolved in soda-water, v. A-117. *Pi-
perazin*, gr. xvss to xxx (1 to 2 grms.)
daily, v. A-118.
FOR EXCESS OF URIC ACID, alkaline
potassium salts and *piperazin*, i. K-8.
FOR CONTINUOUS CARDIAC PAIN, *tinct.*
of *picrida erythrina*, gtt. xx morning
and evening, and gtt. lxxx may be
given daily, i. B-33. *Piperazin*, gr.
xv (1 grm.) per day, well diluted with
water, i. K-8. General faradization,
i. K-8.
CHRONIC. *Piperazin*, gr. xv (1 grm.)
per day, well diluted in water, i. K-8.
Salipyrin, gr. xvss (1 grm.) t. i. d., v.
A-123.
RHEUMATIC. *Tinct. colchicum*, Mj
(0.06 grm.) ev. 8 hrs., v. A-46.
HEMATERIA (LYSÆMIA).
MALARIAL. *Quinine*, gr. xv (0.97 grms.)
to 9j (1.30 grms.); free purgation, i.
F-12. *Terpentine*, i. F-13. Secondary
cur. of electric battery; *iodine* over
abd.; *potass. iodide* internally, i.
F-73. *Terpentine*, gtt. x ev. 4 hrs.,
i. F-79. *Cutomet*, mod. doses; *Epsom*

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HÆMATURIA, MALARIAL (*continued*).
sults, 5iv ev. 4 hrs. *Tinct. of perchloride of iron*, gtt. iv to xv ev. 4 hrs. Butter-milk diet. *Arsenic (Fowler's sol.)*, i. F-80. *Strophanthine* hypoderm., with *digitalis*, i. F-81, 82.
HÆMOFILIA.
Rest and care, i. L-22. *Ext. hydnastis fl.*, gtt. xx, i. L-23.
HÆMOPTYSIS.
In severe cases, *atropine* gr 1-60 (0.001 grm.), repeated in an hour or until pupils dilate, v. A-25. *Ext. hydnastis Canad.*, fl. gtt. xx to xxx, often repeated, v. A-73.
HÆMORRHAGE.
ARTERIAL. *Turpentine*, Mxx (1.23 grms.) ev. 2 hrs., v. A-140. Intravenous inject. of common salt, v. A-127.
HÆMORRHOIDS.
Belladonna, v. A-25.
To RELIEVE ITCHING, *tuercium scordium*, v. A-131.
HAY FEVER. (See NASAL CAVITY, ANTERIOR DISEASES.)
Sulphate of sod., gr. xx (1.3 grms.) on retiring. *Euphorbia pulifera*. Anæsthetic nose with *cocaine*, then spray with sol. of *iodide of mercury* (1-1000), with hypodermatic of *morph.* to relieve the pain. *Terpin hydrate* in 5-gr. (0.3 grm.) capsules; give gr. xv (1.0 grm.) during each meal and at bed-time. *Appl. chromic acid*, iv. D-34. Electro-cauterize terminal filaments of nasal cavity, iv. D-35.
HEADACHE. (See CEPHALALGIA.)
Phenacetin in large doses; *arsenic*, and the *binoides*. *Salicylates* and *chloride of ammonia*. *Antipyrin*, ii. C-2. *Eucalypt*, v. A-64, 65. Hypnotism, v. A-92.
IF SEVERE AND WILL NOT YIELD TO MEDICAL TREATMENT, trephine, ii. A-45.
FOR HYPERACIDITY OF STOMACH, *bicarbonate of soda*, ii. C-2.
IF OF GASTRIC BILIOUS ORIGIN, massage, ii. C-2.
IN CASES OF CONGESTION, *ergot*, and galvanism to cervical sympathetic, ii. C-2. *Belladonna*, v. A-21.
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PREMENSTRUAL. *Bromamide*, gr. xv (0.97 grm.), v. A-31.
REFLEX. *Bromamide*, gr. xv (0.97 grm.), v. A-31.
HEART, DISEASES.
ENDARTERITIS. For continuous cardiac pain, *tinct. of pascidia erythrina*, gtt. xx morning and evening, and gtt. lxxx may be given daily, i. B-33.
HYPERTROPHY. High altitudes, as St. Moritz, v. E-2.
HYPERTROPHY WITH INSUFFICIENCY. *Flt. ext. viscum album*, Mxx to xxx (1.23 to 1.83 grms.), v. A-142.
FOR DYSPŒA, *viscum album*, v. A-142.
MYOCARDITIS.
CHRONIC. For continuous cardiac pain, *tinct. of pascidia erythrina*, gtt. xx morning and evening, and gtt. lxxx may be given daily, i. B-33.
SYMPHATIC. If failure of compensation, *subcut.* injections and large doses of *iodide of sodium*, i. B-19.
TACHYCARDIA. *Tinct. coronilla varia*, Mxlii to lxxij (3 to 4 grms.) daily, v. A-50.
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FOR REGURGITATION, *digitalis* in large doses, i. B-30.
INSUFFICIENCY. For oedema in, *digitalis* gr. lxxij (4 grms.) in 24 hrs., v. A-51. For dyspnea in, *digitalis* gr. lxxij (4 grms.) in 24 hrs., v. A-51.

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 FOR INSUFFICIENCY, with relative tricuspid insufficiency with edema, *diuretin* gr. xlv to xc (3 to 6 grms.) daily, at intervals of 2 to 3 hrs., i. B-34. *Digitalis* carefully used, v. A-56.
 FOR MITRAL REGURGITATION with failure of cardiac compensation, *belladonna*, v. A-21.
 FOR EDEMA, *diuretin*-*Knoll*, 5i $\frac{1}{4}$ to 1i $\frac{3}{4}$ (5 to 7 grms.) daily; *digitalis*, i. B-33.
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HERNIA.
 Taxis, Del Valle's method. Make suction on abdom. wall by appl. large bowl in manner of a cupping-glass, iii. C-82. Local application of *sulphuric ether*, 2 fluidrachms ev. 10 or 15 min. for several hours, followed by taxis, iii. C-86. Radical cure, conditions indicating operation, iii. C-100. *Richelot's* method, iii. C-101. *Kocher's* method; *Kocher's* new method; *Turbot's* of sac; *Bottini's* method; *Parina's* method, iii. C-102. *Landerer's* plastic herniotomy, iii. C-103. *Schwalbe's* alcohol-injection method, iii. C-103, 104. Taxis, iii. C-81, 82. When in doubt, operate, iii. C-81. Radical treatment: *Schede's* method; *Macewen's* method; *Berger's* method; *Salzer's* method; *Marchand's* method; *Schwartz's* modification of *Marchand's* method, iii. C-110. Radical cure: do abdom. section, draw out intestine in successive portions and fold mesentery upon itself; retain by interrupted sutures, iii. C-104. Open method, iii. C-105.
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FEMORAL. Expose bowel by incision; if circulation be re-established, return sac and contents. Median incision; liberate bowel by traction from within and pressure from without, iii. C-89. If containing appendix, and gangrenous, divide stricture, draw down cæcum, remove appendix, insert peritoneal surfaces and fasten with Lembert sutures, iii. C-89.
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INGUINO-SCROTAL. Open, divide constrictor at both internal and external ring, and allow bowel to return, under strict antiseptic precautions, iii. C-85. Remove testicle and appendix, iii. C-88.
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agitation, give monomorph. of camphor,
gr. iss (0.10 grm.) t. i. d., ii. D-23.
IF OCCURRING IN EPIDEMICS, careful
investigation of hygienic conditions,
as good ventilation, exercise, etc., ii.
D-26.
IF CONTRACTURES OCCUR, give anæ-
sthetic and straighten limbs, and retain
by means of plaster-of-Paris dressing,
ii. D-26. For spasms, cold hands and
feet, suffocating spells, etc., *amyl ni-
trite*, grt. 1-1000 to 1-100 in cold water,
internally, or in larger amounts by
inhalation, v. A-5.
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and furnished with a glass funnel.
Hold child in half-reclining posture,
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INFLUENZA, COMPLICATIONS (*continued*).
FOR HEADACHE, *phenacetin*, *sabot*,
33 gr. xxx (2.00 grms.), *ergotin*, gr.
xij (0.75 grm.). M. et. div. in capsule
no. xij. Sig.: One capsule ev. 3 hrs.,
i. H-23.
FOR INSOMNIA. Prolonged warm
baths. *Sulphur* and *paraldehyde*, i.
H-23. *Phenacetin*, combined with
quinine or *hyoscine* and *camphor*, i.
H-23.
FOR LARYNGITIS, inhalations of *crea-*
sete, i. H-23.
FOR PAINS IN HEAD AND BACK, *anti-*
nergin, gr. vii $\frac{1}{2}$ (0.5 grm.) 4 times
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ABSCESS. Open, irrigate with 1-to-1000 warm bichloride sol.; then *peroxide of hydrogen*, drain, and dress antiseptically, iii. B-29.

CYSTS.

HYDATIDS. Resect rib, and remove cyst, iii. B-35. Pneumonotomy, iii. B-36. Thoracotomy and pneumonotomy, iii. B-37.

GANGRENE. Open, wash thoroughly and drain, iii. B-28, 29. Resection of lung, iii. B-30.

HEMORRHAGE. *Torpedine*, III xx (123 grms.) ev. 2 hrs., v. A-140. *Succinate of iron*, v. A-85.

WOUNDS.

GUNSHOT. Dress external wound with *iodoform* and *vaselin* on lint with gauze tissue, iii. B-5.

FOR SHOCK, ether, ammo., and brandy; later, *morphia* in small doses, iii. B-5.

PENETRATING. Cover wound with wet bichloride gauze (1 to 2000). Carbolyzed applications, iii. B-9.

IF FLUID ACCUMULATES IN PLEURAL CAVITY, aspirate, iii. B-6.

LUPUS. (See TUBERCULOSIS, CUTANEOUS.)

LYMPHANGIOMA.

Surgical interference, iv. A-50. Appl. of caustics, iv. A-51.

LYMPHANGITIS.

Thiol locally, v. A-134. *Methylene blue*, v. A-7.

MADURA FOOT.

Amputation, iv. A-52.

MALARIAL FEVER.

PROPHYLAXIS. *Quinine*, gr. iv (0.26 grm.) twice daily, i. H-70.

CHRONIC. *Acetanilid*, *sulph.*, *quin.*, *sulph.*, Rf gr. xxiv (1.55 grms.). M. ft. capsule No. xij. Sig.: One ev. 6 hrs. *Methylene blue*, gr. iss (0.1 grm.) 5 times a day, and, to prevent stranguary, combine with *antecy*, v. A-6, 7.

Quinine and *alcohol*, i. H-74. *Iron*, beginning with small doses, and gradually increasing, v. A-85.

COMPLICATIONS.

CONVULSIONS, FOLLOWED BY STUPOR AND DELIRIUM, *quinine bisulph.*, gr. xv (1 grm.) daily. Large doses *quinine* and sol. of *potassium arsenite*, i. H-75.

HEMATURIA. *Torpedine*; salines. Keep up nutrition by means of *iron* and *arsenic*, i. H-76.

NEURITIS. Electricity, i. H-72.

PARALYSIS. *Quinine*, in large doses, i. H-72.

GENERAL TREATMENT. *Cinchonine*, *Cinchonine sulph.*, gr. xxiij (1.5 grms.), i. H-77. *Methylene blue*, gr. iss to iij (0.1 to 0.2 grm.) 5 times daily, i. H-77, 78. *Methylene blue*, *Alkaline nitrates* (*potassium and soda*), gr. xv½ to xxiij½ (1 to 1.5 grms.) i. *Carbolic acid*, 2 to 5 % *glycerin* sol., 100 drops injected beneath the skin. If paroxysm is repeated, 100 drops of a

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Baskett, Hugh A. Cowing, iii. B-19; J. M. Krim, Oncheterlong, I. W. Irwin. Satterwhite and W. T. Dulany, W. O. Roberts, J. C. Artigas, M. Alph. Guehin, G. Sec. M. Hardy, Dunard, Beaman, P. L. Cohen, Dienlafoy, B. Champ, Letulle, Trastot, A. Ponchon, Thomas Linn, E. D. Ferguson, Quenn, Vernenil, Pcan, Le Fort, iii. B-20; Vernenil, Hardy, Dienlafoy, iii. B-21.

PNEUMOTHORAX: J. M. Anders, Ernest Laplace, G. A. Sutherland, W. D. Gairdner, Leonard G. Guthrie, Samuel West, iii. B-13; Douglas, Powell, iii. B-14; Wilson Fox, Hilton Fagge, Guthrie, iii. B-15; W. H. Bowes, iii. B-16.

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LUNGS AND PLEURA, DISEASES OF—James T. Whittaker, E. S. McKee, S. P. Kramer, i. A-1.

LUPUS—Unna, Cognacq, iv. A-49; Dühring, Van Harlingen, Broca, Corlett, iv. A-48; Moty, Thiersch, Gilford, Bonshine, Carl Szadek, Hasland, J. Levison, Bonardini, iv. A-49.

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tion with current of 30 to 40 milliamp.
for 5 min., to be made about time
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and, a few days before the expected
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negative pole, v. D-1. Treat endome-
tritis and habitual conception; re-
moval of all obstacles to pelvic cir-
culation by hot inject. and tampons of
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tion; enuretage; appl. of galvanic cur-
rent, either internally, by abdom., or
by sacro-vaginal method, v. D-1.
Smith's method, v. D-2. Large doses
of bromides (especially the three salts
in combination,—*potash, soda, and*
ammonia) each night, with *antipyrin*,
gr. v (0.32 grm.) every hour when the
pains begin, and continued for six
doses; *phenazonum* to lessen the dis-
charge; if discharge is scanty, hot
bath, followed by the mixture of *bro-*
mide, gr. x to xx (0.65 to 1.30 grms.)
of each; for gastro-intestinal derange-
ment, mixture of *calcium chloride* or
hypophosphite of lime with *phenazo-*
num, gr. v (0.32 grm.) every hour, up
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dermatic injection of *sulphate of atro-*
pine, gr. 1-20 (0.00032 grm.), twice
daily, ii. F-10. *Hydrochloric*, a 10%
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THERAPEUSIS.

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HAY FEVER. *Salicylate of sodium*, gr. xx (1.3 grms.), on retiring. *Euphorbia pulifera*. Anesthetize nose with *cocaine*, then spray with sol. of *iodine* of apocryne (1 to 1000), with hypodermatic inject. of *morph.*, to relieve the pain. *Tripin hydrate* in gr. v (0.3 grm.) capsules; give 15 gr. (1.0 grm.) during each meal and at bedtime. Apply *chromic acid*, iv. D-31. Electro-cauterize terminal filaments of nerves in nasal cavity, iv. D-35.
TUBERCULOSIS. If yellowish, dense crusts form, soften with following salve: *R. Vaselin*, 5i $\frac{1}{4}$ (40.0 grms.); *Aristol*, gr. xlv (3.0 grms.); *Mercurialized iodol*, gr. v (0.3 grm.). M. 12 to 15 applications of the galvanocautery and hasten repair of tissues; use nasal douche of tepid water morning and evening, to which has been added a teaspoonful of the following mixture: *R. Rectif. alcohol*, 5iiss (200.00 grms.); *naphthol*, 5iiss (10.00 grms.); *menthol*, gr. viiss (0.5 grm.); *thymic acid*, 1i $\frac{1}{2}$ xxx (2.0 grms.). M. After the douche, every three or four days apply the following on a tampon: *R. Dist. water*, 5iiss (50.0 grms.); *trichloroacetic acid*, 5iiss (5.0 grms.). M. The days this solution is not used apply the following, night and morning: *R. Camphorated naphthol*, 5v (20.0 grms.); *pure carbolic acid*, 1i $\frac{1}{2}$ viiss (0.5 grm.); *glycerine*, 5vj (25.0 grms.). M. Insufflate the following powder through the nose 10 to 12 times per day: *R. Aristol*, gr. xlv (3.0 grms.); *pule*, *naphthol*, gr. xlv (0.5 grm.); *boric acid*, 5iiss (10.0 grms.); *resorcin*, gr. xxx (2.0 grms.). M., iv. D-22.
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 PHARYNGITIS. *Sol. benzoin*, 5j (3.89 grms.) doses to children, or 5ij (11.66 grms.) to adults, v. A-27. *Rosella tinctoria* as gargle, v. A-92.
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the advantage being pureness and
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and fresh air, v. E-13.

TUBERCULOSIS.

GENERAL TREATMENT. *Creasote*, $\text{M}\frac{1}{2}$
to $\text{ii}\frac{1}{2}$ (0.1 to 0.15 gm.) in gelatin
capsules, with *cod-liver-oil* or *olive-oil*,
and increase gradually to $5\frac{3}{4}$ to j (3
to 4 grms.) daily, or may be combined
with 2 parts of *tinct. of gentian* or with
nux vomica. *Creasote* by inhalation,
i. A-14. *Guaiacul carbonate*, gr. iii
to viiss (0.2 to 0.5 gm.) morning and
evening, and rapidly increase to 5ss
(6 grms.) daily. *Methylene blue* in-
tern. or by parenchymatous injection.
Subcutaneous inject. of 1 to 3 syringe-
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daily; children, $\frac{1}{2}$ to $\frac{1}{2}$ drops daily;
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Benzosol, gr. xvss (1 gm.) t. i. d., v.
A-29. R *Benzosol*, $5\frac{1}{4}$ (5 grms.); *es-
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into 10 lozenges, and take 1 t. i. d.
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the next 3 wks., 6 daily; during the
5th week, 3 daily; omit during 6th
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Oj—18 to 500 grms.), the vagina being
tamponed in the meantime with *gly-
ceride of tannin*; applications every
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emollient injections containing extract
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phor* three or four times weekly, anti-
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520. Gazeta lekarska, Warsaw.
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609. Archiv für Anatomie und Entwicklungsgeschichte, Leipzig.
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611. Medical Current, Chicago.
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619. Revista médico-farmacéutico de Aragón, Zaragoza.
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784. Revista médica de México.
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806. Archives of Surgery, London.
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809. Zeitschrift für angewandte Chemie, Berlin.
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814. Merck's Bulletin, New York.
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820. La medicina popular, Barcelona.
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823. Archivio della riforma medica, Naples.
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827. Le mercredi médical, Paris.
828. Untersuchungen aus dem physiologischen Institut der Universität, Halle.
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842. Journal of the British Dental Association, London.
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850. Northwestern Medical Journal, Minneapolis.
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857. Annales de la Asistencia Publica, Buenos Ayres.
858. Johns Hopkins Hospital Reports, Baltimore.
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901. Medical Times and Gazette, London.
902. Journal für praktische Chemie, Leip-zig.
903. Schweizerische Wochenschrift für Pharmacie, Schaffhausen.
904. Bulletin de la Société impériale et centrale de médecine vétérinaire.
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906. Journal of Balneology, New York.
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908. Bulletin de la Société de chirurgie, Paris.
909. Revue odontologique, Paris.
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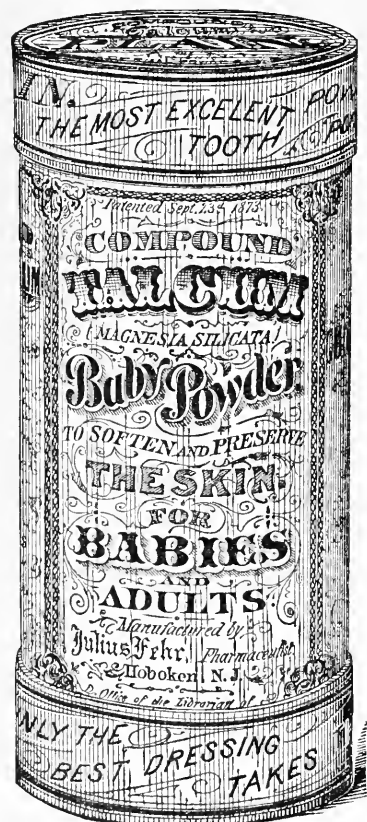
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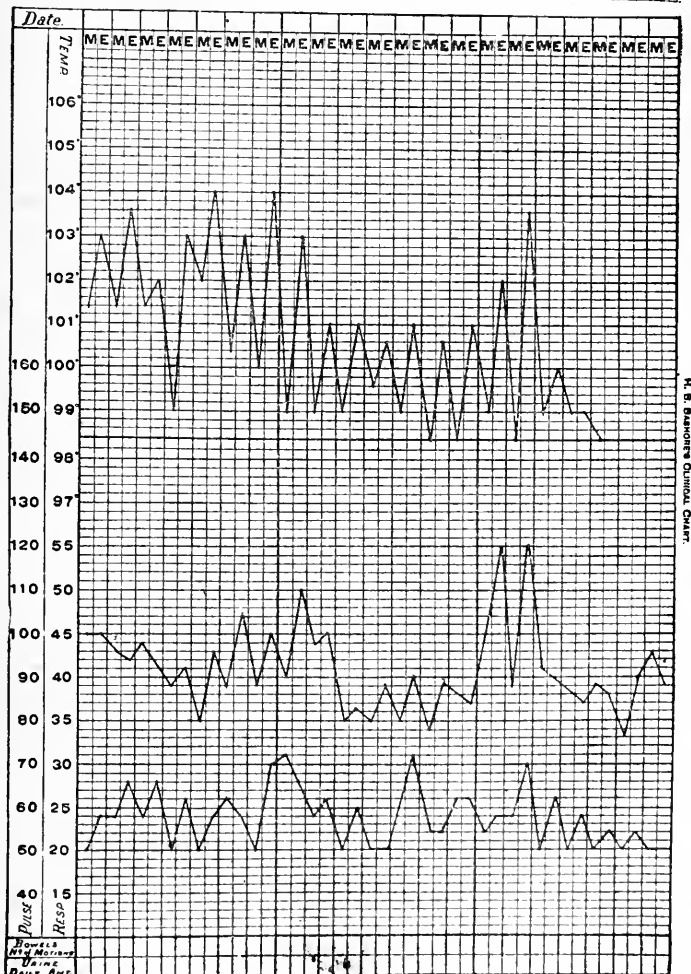
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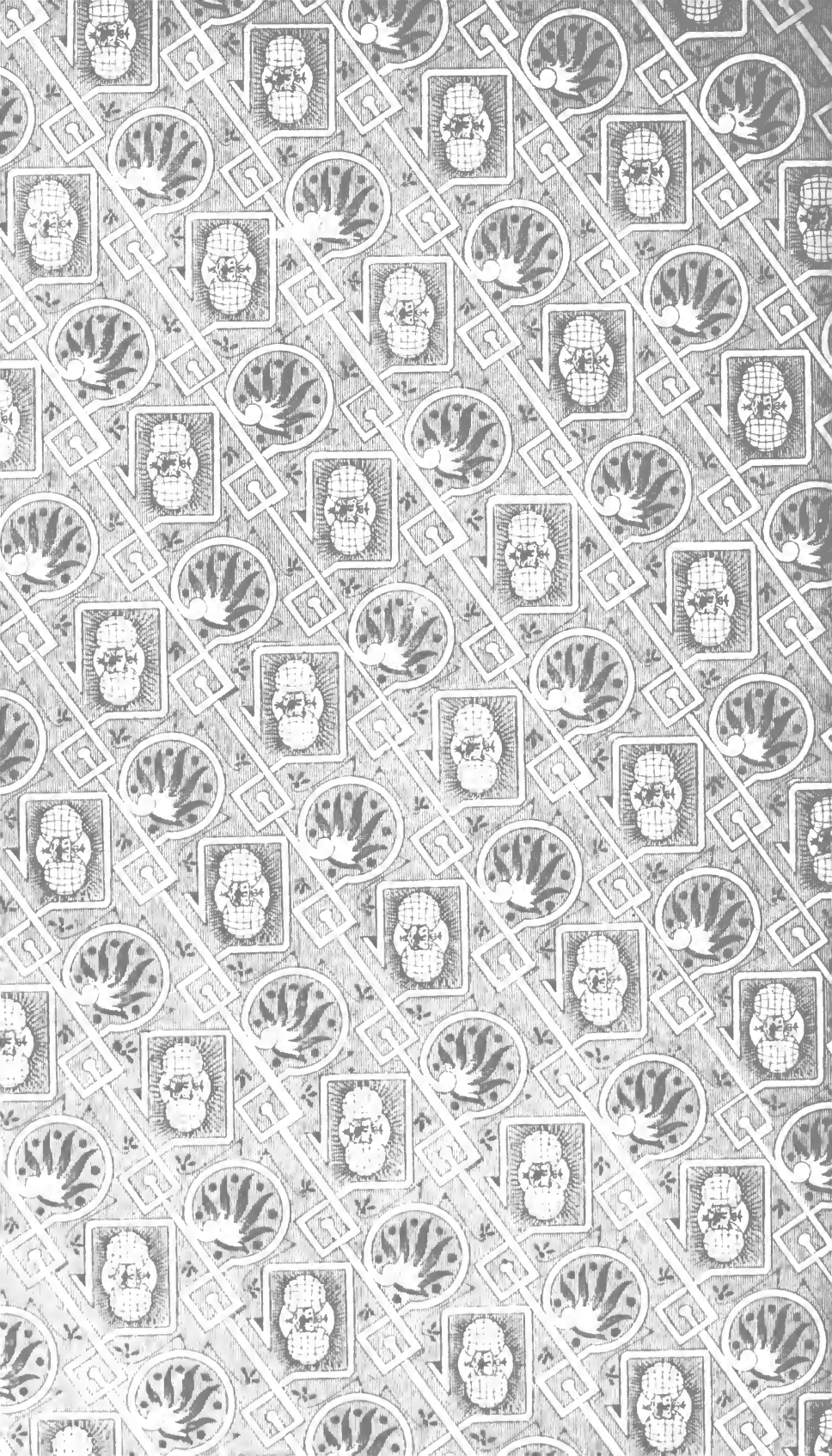
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